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## PELLAGRA:
## A CRITICAL REVIEW OF THE LITERATURE SINCE 1914.

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There can be no question that the study of pellagra is almost entirely centred in the search for the causation of the disease. Until more light is thrown upon this, one of the most fascinating problems in the whole realm of medicine, the question of prevention and cure of the disease must be vain. Indeed, new outbreaks of pellagra are examined purely in the hope that some hitherto overlooked factor in etiology may be discovered. No apology, therefore, is needed for limiting this review to a discussion of possible etiological factors and nothing more.

The old fight around the subject of maize as a cause of pellagra still continues, but upon wider lines. The old view that pellagra was due to maize itself, whether good or bad, has developed into the food deficiency theory, while the view that bad maize was the causal factor has been born again in the infection or toxin theory. The modern fight now rages with the same vigour, with the same bias as of old, but with more material in the shape of better and more widespread observations. It seems that the modern worker upon pellagra is almost forced to become an adherent of the "food deficiency" school or of the "infectious" school.

In a review such as this it is necessary to state first of all the case for each school without bias and to reserve criticism, as far as possible, till the end.

### *The Views of the "Food Deficiency" School.*

To GOLDBERGER and WHEELER (1915) (1920) belong the credit of first setting the view that pellagra is a food deficiency disease upon a basis of experimental fact. The Rankin Farm experiment has become classic. Eleven convicts volunteered to subject themselves to a given diet deficient in animal protein in exchange for a free pardon. Within four months six, if not seven, of these men developed symptoms of pellagra. There appears now to be no doubt that the condition really was pellagra, in fact it is possible that GOLDBERGER has understated rather than overstated his case.

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No less striking were the Institution experiments of GOLDBERGER, WARING and WILLETS (1915). Two orphanages, A and B, were selected, the former showing 79 cases of pellagra in the spring and summer of 1914, while the latter, during the same period, had 130 cases. In September, 1914, the diet was generously increased in respect of fresh meat and leguminous protein food ; milk and eggs also were used freely. In the following year there was no case of pellagra in orphanage A and only one in orphanage B. Similar results were obtained in an asylum. In this case there were 72 pellagrins in one year and no recurrence of the disease in the following year after the diet had been altered. But of 32 control pellagrins kept upon the old diet 15 presented recurrences. Another very striking observation, which has not received the attention it deserves, was made by the same workers (1914), viz., that no man in the army of the United States or of Italy has ever developed pellagra unless the disease was present before enlistment. The late Dr. SANDWITH was of the opinion that the same was true of the Egyptian army. The assumption, of course, is that the good and regular feeding of the army is prophylactic against the disease.

With the war came fresh outbreaks of pellagra, and with them came much new work and renewed enthusiasm. The epidemic among Turkish and German prisoners of war in Egypt was especially interesting in this respect, and without doubt the observations it called forth rank second only in importance to the pioneer work of GOLDBERGER. It is not necessary to deal in any detail with this outbreak ; suffice it to say that among Turks up to the end of 1919 there had been 9,257 cases of pellagra among a total of 105,468 prisoners, while among the Germans there were 79 cases out of 7,600 men. During 1919, though the disease had greatly declined and many of the prisoners had been repatriated, there were 1,617 deaths, of which six were in Germans.

Out of the enormous volume of work done during this outbreak, both by individuals and commissions, the name of W. H. WILSON emerges supreme. Without his splendid assistance the significance of the epidemic as regards the etiology of pellagra would have been lost. WILSON's contribution (1921) to the subject may be given as follows : (the words are taken from the reviewer's abstract of WILSON's paper) " The sufficiency of protein must not be reckoned by its gross weight, but by its assimilable value. In other words, the important factor is the biological value of the protein. Proteins differ considerably in their biological value. For estimating the comparative value of a given amount of protein one has to divide the total quantity by one of the following factors :—Animal protein, 1, rice protein, 1·12, potato, 1·27, pulse, 1·82, wheat flour, 2·55, maize, 3·4. Thus a man weighing 70 kilos, to maintain his nitrogenous equilibrium, must take 30 gm. of protein daily if he take meat as his source, but 102 gm. of protein are necessary if he consume the maize variety. The figure 40 may be taken as the minimum of safety for the biological value of protein, though many healthy individuals may escape disease with a B.P.V. of only 20. When hard labour is indulged in 50 would be a safer figure, and for a community with chronic intestinal disease, or one previously affected with pellagra, a figure even of 60 is not too high."

Upon these conclusions WILSON proceeds to examine the diets during the exhibition of which pellagra has occurred. Thus in the Rankin Farm experiment the biological value of the protein was only 1·46. In the outbreak among Armenian refugees at Port Said

the diet had a B.P. value as follows :—for males (fifteen years and upwards), 23 ; for females (fifteen years and upwards), 18·4 ; for children (five to fourteen years), 13·8 ; for children up to four years, 7·3. The disease practically disappeared on a diet the B.P.V. of which was 43·7 for the healthy and 59·15 for those who had suffered from pellagra or were ill-nourished.

For Turkish prisoners of war in Egypt the diet apparently responsible for a large number of pellagrins had a B.P.V. of 33·5 for the non-labour group and 36·8 for the labour group. Many other diets are discussed which seemed very poor and yet it was found that pellagra did not develop in those subsisting upon them. All had a B.P.V. of over 40.

As pointed out by WILSON, a deficiency of protein may take place in one of four ways: "(1) Absolute deficiency of intake below the normal requirements. (2) Deficiency relative to individual or energy requirements. (3) Deficiency due to low availability of protein resulting from the nature of the food or defective preparation. (4) Secondary deficiency due to excessive bacterial destruction of protein in the intestine or defective powers of digestion or assimilation."

As regards the part played by accessory food substances nothing very definite has transpired. MCCOLLUM and SIMMONDS (1917) have pointed out that in GOLDBERGER's diet there was a deficiency of certain inorganic salts as also of fat-soluble vitamin. Other workers have attempted to trace a possible connexion between the absence of vitamins and pellagra, but the evidence is not convincing.

The modern tendency is to regard the biological value of any protein as dependent upon the amino-acid grouping in that protein. GOLDBERGER and TANNER (1922) have developed this idea. It may be that the reason why pellagra is so common in maize-eating countries is because maize protein—zein contains no tryptophane and no lysin. WILSON has pointed out that indican in the urine (so commonly in excess in pellagrins) must be derived from the tryptophane in the food protein. If, therefore, the supply of tryptophane to the body is small, and that little used up by putrefactive organisms and converted into indican, it is evident that at least one amino-acid grouping is being assimilated very little, if at all.

Let these remarks close the case for the "food deficiency" school.

### *The Infection or Toxin School.*

The views held by the members of this school are very much more difficult to describe for the simple reason that no two members hold similar views as to the exact organism or toxin supposed to be the cause of pellagra. Perhaps the easiest method to pursue is to take the views held by different observers or groups of observers separately.

The Simulium theory of SAMBON (1910) (1913) has apparently died a natural death. So many cases of pellagra have been described in which no possible contact with any such fly can be traced that we can now neglect it. Nevertheless, SAMBON has done useful work in pointing out that the periodicity of pellagra, as also its symptoms, course, duration and its pathological and post-mortem findings, strongly suggest a parasitic origin. Undoubtedly too, pellagra does appear to manifest itself in certain definite regions but this fact may be explained by the assumption that similar conditions of diet, etc., will naturally obtain in similar places quite apart from any parasitic infection.

Rickets, for example, does favour certain areas, but nobody has suggested its infective origin on that account.

The view of ALESSANDRINI and SCALA (1913) that pellagra is due to Colloidal Silica in water does not deserve further comment.

The work of SILER, GARRISON and MCNEAL (1914) (1917) certainly merits discussion. These workers were members of the Thompson-McFadden Pellagra Commission which began its observations in South Carolina in 1912. After most careful and systematic search they came to the conclusion that pellagra was spread from case to case by direct infection. Speaking of two small towns in South Carolina where pellagra is rife they stated that "since 1914 practically all the new cases of pellagra in that community developed while the person was residing in the same house with, or next door to, a pellagrin in the active stage of the disease, or within six months after such exposure." In their various other reports similar views are stated and substantiated. As regards the mechanism of spread at first it was thought that the stable fly, *Stomoxys calcitrans*, was responsible. Later, the possibility of sewage playing a part became more probable. In some districts it was found that installation of a proper sewage system "almost wholly" arrested the disease. The question of diet in South Carolina was not neglected. It was found that only 1·37 per cent. of villagers who drank milk developed pellagra. Again 4·88 per cent. of those who eat fresh meat every day became pellagrous, and only 1·37 per cent. among those who eat no meat at all. Daily administration of milk and eggs was insufficient to protect against the disease.

Naturally the possibility of intestinal parasites and bacteria playing a role in pellagra etiology has been received by many as a certainty. Many and divers worms and other intestinal flora and fauna have been blamed, but for the most part the charge against them has not been maintained because they are also common dwellers in the intestines of those who are not pellagrins. Perhaps the only individual group which need seriously be considered is the *B. Welchii* and its relations. HOLMES (1916) reported the presence of large numbers of these organisms in pellagrous stools, and MARETT (1920), working at the pellagra outbreak amongst Turkish prisoners of war in Egypt, found a similar state of affairs. MARETT found that cultures taken from the stools of definite pellagra cases and from the small intestine post-mortem showed in 90 per cent. of the cases organisms undistinguishable from *B. Welchii*. Stools from healthy Turks did not show these anaerobes. While these observations are undoubtedly important the fact must not be lost sight of that, as MCCARRISON has shown, intestinal troubles of various kinds may be actually produced by certain diet deficiencies alone.

It has been stated that maize and maize flour obtained from an endemic centre of pellagra in Egypt contained anaerobic, spore-bearing organisms.

Another aspect of the infective theory has been discussed by Seale HARRIS (1919). This writer stated that during the great war nature subjected the inhabitants of Europe to an exactly similar dietetic experiment as that of GOLDBERGER and his eleven convicts at Rankin Farm. The similarity, however, proved to be only upon the surface, for in those countries where pellagra was unknown, or very rare, practically no outbreaks occurred, while in those countries, like Italy, where the disease was rampant before the war the numbers of pellagrins did not increase but even showed a marked decrease. HARRIS is of the opinion that GOLDBERGER'S experiment has been repeated upon

an enormously greater scale without a similar result. This is in favour of the infective origin of pellagra.

Against the views held by the "Infective" school the rival faction has risen up in arms. In 1916 GOLDBERGER instituted a remarkable experiment in which 16 persons, including one woman, ate the scales, urine and faeces derived from pellagra patients. They were also injected intra-muscularly and subcutaneously with pellagrous blood, and pellagrous secretions were applied to the nose and naso-pharynx. These heroic experiments were carried on for a period ranging from 4½ to 6½ months. Not one of the 16 persons developed pellagra.

Not content with this, GOLDBERGER, WHEELER and SYDENSTRICKER (1920) studied the condition in South Carolina where the Thompson-McFadden Commission did its work. Here, in opposition to the latter's conclusion, it was found that the diet of pellagrous households was deficient in protein, in vitamins A and B, and in mineral constituents. It was also discovered that "in general pellagra incidence was found to vary inversely to family income."

Mention, too, must be made of the poor and indefinite results obtained in the attempt to transmit experimentally pellagra to animals. All sorts and conditions of animals have been subjected to experiment, but the most that can be said is that in a few instances symptoms somewhat resembling pellagra have been produced.

One of the strongest arguments used against the infective nature of pellagra is that in no recorded case has it been shown that any person attending pellagrins in hospital or elsewhere has contracted the disease. A possible exception to this came under the reviewer's notice in England a short time ago. A lady who had been healthy all her life and living under the best conditions during three springs in succession became ill, lost her appetite and suffered from various gastro-intestinal and nervous symptoms. One spring a typical pellagrous dermititis appeared together with all the usual symptoms of the disease. The husband of this lady works in a large asylum close by which, so far as the knowledge of the reviewer goes, is the only endemic centre of pellagra in the country. It is strange that this case should have developed in this neighbourhood just where, if infection is present, it should have occurred. This case may be only a coincidence ; on the other hand it may not.

It is extremely difficult to account for the sporadic cases of pellagra which occur in the British Isles from time to time on the assumption that the disease is an infection.

### *Discussion of Pellagra Etiology.*

The reviewer has done his best to recapitulate without bias the views of the two schools of pellagra etiology. There now remains the infinitely more difficult task of attempting to assess the value of the respective views. In the first place one fact must be clearly appreciated, viz., pellagra is a disease of almost infinite variation. Those who have lived among pellagrins for many months, as the reviewer has, must be struck by the extraordinary difference in the severity of the disease presented by different cases. There is as much, or greater, difference between a slight cold in the head and heliotrope influenza as there is between a mild and a severe case of pellagra. So obvious is this that immediately the question arises, is pellagra a clinical entity at all? Is it not merely a syndrome and therefore

capable of being brought about by more than one cause? A study of the disease clinically must compel us to answer these questions in the affirmative. At least three different grades of the disease may be recognized: (1) Where there is mere protein starvation. As a type of this variety the case of the small Arab boy described by WILSON may be taken. Here the addition of one egg a day was sufficient to bring about a cure. It is probable that GOLDBERGER's convicts in the Rankin Farm experiment also belonged to this class. (2) The second grade is one in which the patient has lost his nutritional balance, as it were, but by careful and prolonged treatment this is regained. In this variety it is possible that as the result of protein starvation, or some other food deficiency, organic defects in the intestine have taken place which render the assimilation of the diet supplied inadequate. That these defects are not permanent is shown by the fact that the balance of nutrition is slowly regained and the patient recovers from the attack. On the other hand it may be argued that some weakness remains, since such patients are always liable to relapse in the corresponding season of the following year. Where this weakness lies and what its nature may be defies imagination. That it does exist is only too obvious in the experience of pellagra observers. (3) The third grade is that in which the food deficiency, as it were, comes from within. The defect here is not in the diet intake but in the assimilation of the diet, however generous in itself. This assimilation defect must be due either to some alteration which occurs in the food during its passage through the body or to some inability on the part of the body cells to deal with it. It is in this class of case, unfortunately not rare, where treatment of any kind seems to be of no avail. The patient day by day slowly slips down the hill until he approaches his end, which is sometimes so indefinite that it is difficult to say the exact moment when death has actually taken place.

Such grades of pellagra, for a knowledge of which we are largely indebted to WILSON, must appeal to clinical workers in whatever part of the globe their observations of the disease may take place. If it be clearly understood that pellagra is a syndrome of complex etiology and not a clinical entity due to a single causal factor much will have been attained. What would we now think of observers who in years gone by considered jaundice to be a clinical entity? With what shame would we regard the petty quarrels between the obstructionists and the non-obstructionists, between the holders of the infective view and the mechanical view?

Modern work on pellagra has apparently brought us to this stage. Many are the problems which still await solution. There still remains the problem of the connexion between pellagra and such diseases as war-oedema and acrodynia and the question whether much chronic but slight ill-health is possibly a first and unrecognized stage of a food deficiency which never advances far enough to disclose its real nature. In conclusion let us think of a disease such as phthisis. As its name implies it was and is regarded as a wasting. The discovery of the tubercle bacillus by KOCH proved beyond doubt the specific cause of the disease and yet the clinician cannot allow himself to lose sight of the fact that it is also a nutritional disorder. It may be that in the future some such dual explanation will be found to account for the more severe grades of pellagra. By considerations such as these it is hoped that the *raison d'être* of the two rival schools will be removed and that further progress will be along a line common to both. As so often happens in human affairs wherever two schools arise with

totally opposite views on any subject the whole truth will be found with neither. It is probably as untrue to say that all cases of pellagra are due to food deficiency as it is to say that all cases are due to infection.

The reviewer has attempted to occupy what the rival schools would regard as no man's land—a dangerous position. Whether truth lies here the future alone can show.

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HARRIS (Seale) (1919), xv, 55.
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MCCARRISON (1919), xvi, 79.
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SAMBON (1910), *Jl. Trop. Med. & Hyg.*, xiii, 271–282, 287–300, 305–314, 319–321; (1913), ii, 485.
SILER, GARRISON & MCNEAL (1914), v, 55; (1917), xv, 54; xvi, 72.
WILSON (W. H.) (1921), xviii, 209.


* References are to summaries in the *Tropical Diseases Bulletin*, unless otherwise stated. Dates in parentheses refer to year of publication of original papers.

## MEDICAL ZOOLOGY.

FAUST (Ernest Carroll) & WASSELL (Corydon McA.). **Preliminary Survey of the Intestinal Parasites of Man in the Central Yangtze Valley.**—*China Med. Jl.* 1921. Nov. Vol. 35. No. 6. pp. 532–561. With 1 map in text.

The survey was evidently sustained with method and care, and its scope included observations of domestic animals that serve as reservoirs or as intermediate hosts of human parasites. The following species are recorded :—

*Entamoeba histolytica* is very common ; foreigners are more subject to acute infections than natives ; *E. coli* is usually associated ; in many cases the whole nuclear detail of the two species has been made out in freshly passed material. Other species of Protozoa found are *Endolimax nana, Trichomonas hominis, Cercomonas longicauda* (once), *Giardia intestinalis, Embadomonas sinensis,* n. sp., *Balantidium* sp., smaller than *coli*. Trichomonas is very common but is usually found in stools that are not normal. Embadomonas was observed in nine patients with diarrhoeic stools. Giardia is considered to be definitely pathogenic, and to yield to oil of chenopodium. *Spiroschaudinnia eurygyrata* has been observed in diarrhoeic stools, in association with some of the species mentioned above.

For some undiscovered reason Cestodes are remarkably uncommon. *Diphyllobothrium mansoni* was found once, and the related species in the dog and cat is also uncommon ; *Taenia saginata* once and eggs of a Taenia once ; none of the dogs examined had *T. echinococcus* ; eggs of *Hymenolepis nana* in four cases ; *Dipylidium caninum* not observed in man, but found in dogs and cats.

" Domestic animals are, on the whole, more heavily infected with human flukes than man himself, and are the true reservoir," as, perhaps, too few clinicians realize. The following Trematodes are noticed : *Fasciola hepatica* common in sheep, and *F. gigantica* in local bovines ; *Fasciolopsis buskii* ; *Paragonimus ringeri* ; *Clonorchis sinensis* common in dogs and cats ; *Metagonimus yokagawai* once in cat ; *Echinochasmus* spp. in dogs and cats ; *Schistosoma japonicum,* but no cercariae found in any snails examined.

The following Nematodes are recorded :—*Ascaris lumbricoides* (the commonest), *Ancylostoma duodenale* and *Necator americanus, Trichuris trichiura, Strongyloides stercoralis, Filaria bancrofti, F. circumocularis, Oxyuris vermicularis, Gnathostoma spinigerum* in a cat, and a related species in a dog.

*Gigantorhynchus gigas* is common in hogs.

In comparing this survey of the Central Yangtze Valley with MAXWELL's survey in Fukien, the authors remark that while the two areas agree in climate and in the habits of the population, only part of the parasitic fauna of man (and reservoir animals) is common.

A. Alcock.

NEDERGAARD (N.). **Intestinal Parasites in Eastern Cuba.**—*Southern Med. Jl.* 1921. Dec. Vol. 14. No. 12. pp. 971–973. With 3 text figs.

The survey extended over 12 months. The number of admissions to hospital was 5,613, the majority being males between 15 and 40 years. The number of " stools examined " was 3,945 ; Ancylostoma and

Necator were found in 1,636, Ascaris in 780, Trichocephalus in 1,341, Strongyloides in 183, Trichomonas in 195, *Entamoeba histolytica* in 25, *Balantidium coli* in 24, *Entamoeba coli* occasionally, Prowazekia once.

A few cases of mild diarrhoea were observed of which the only evident cause was *Balantidium coli*; after one or two doses of mag. sulph. or ol. ric. both diarrhoea and Balantidium would disappear. Many cases of malaria with concurrent hookworm did not respond to anti-malarial treatment until the hookworm infection was treated.

A. A.

YOUNG (C. J.). **Human Intestinal Protozoa in Amazonas.**—*Ann. Trop. Med. & Parasit.* 1922. Mar. 31. Vol. 16. No. 1. pp. 93–98.

This paper records the results of examination of faeces (one stool in each case, and one specimen of it unless to settle a doubtful point) of 500 residents of Manaos, of whom 249 were children of school age, and 251 were Federal troops. The following protozoon cysts were found :—

*Entamoeba histolytica* in 22·5 per cent. of children and in 27·5 per cent. of troops;

*Entamoeba coli* in 36·9 per cent. of children and in 38·6 per cent. of troops;

*Giardia intestinalis* in 14·0 per cent. of children and in 8·3 per cent. of troops;

*Chilomastix mesnili* in 2·8 per cent. of children and in 4·4 per cent. of troops.

*Entamoeba nana* and *Iodamoeba bütschlii* were also found. *Trichomonas hominis* was not found in any of the 500 cases, but was detected in three hospital cases having diarrhoeic stools.

Blastocystis occurred in 36·1 per cent. of children and 48·2 per cent. of troops.

A. A.

BRUG (S. L.). **Quelques observations sur les protozoaires, parasites intestinaux de l'homme et des animaux.**—*Bull. Soc. Path. Exot.* 1922. Feb. 8. Vol. 15. No. 2. pp. 132–139. With 2 text figs.

Here are described two new intestinal parasites—an Entamoeba and an Embadomonas (or "Waskia")—of the giant water-bug *Belostoma indicum*; also an amoeboid transformation in an altered environment (a strong decoction of "Irish Moss") of *Chilomastix mesnili* [apparently similar to the amoeboid transformation that occurs in the gorged choanocytes of sponges]; also a case—with a brief notice of two other cases—of autochthonous infection, in Java, with *Isospora hominis*. The described case of this infection throws no certain light on the pathology of human coccidiosis as it was complicated with other intestinal infections, but it appeared to end in "spontaneous" extinction.

A. A.

JEPPS (Margaret W.). **Notes on the Intestinal Protozoa of 917 Men at the University War Hospital, Southampton.**—*Jl. Roy. Army Med. Corps.* 1921. Nov. Vol. 37. No. 5. pp. 366–375. With 1 text fig.

The majority of the 971 cases here analysed came from the various fronts in Europe, Asia, and Africa; a few were from Home stations. In 777 of them more than six stools were examined.

Of the 971 cases, 527 were dysentery patients ; 51, though suffering from other intestinal complaints, had a history of dysentery ; 159 were suffering from other intestinal complaints, without having any history of dysentery ; two were cases of liver abscess ; and 95 were a variety of other complaints, of which 25 had, and 75 had not, a history of dysentery.

Altogether 63·4 per cent. of these 971 cases were found to be infected with intestinal protozoa of one or more kinds. The specific infections discovered, and their several percentages, are as follows :—*Entamoeba histolytica*, 23·7 ; *E. coli*, 30·4 ; *Endolimax nana*, 28·6 ; *Iodamoeba bütschlii*, 3·1 ; *Dientamoeba fragilis*, 1·0 ; *Giardia intestinalis*, 13·2 ; *Chilomastix mesnili*, 6·5 ; *Trichomonas hominis*, 1·2 ; also a single instance of *Tricercomonas intestinalis*. (Incidentally, eggs of *Ascaris lumbricoides* were found in 4·7 per cent. of the cases, and of *Trichuris trichiura* in 15 per cent.).

Concentrating attention on *E. histolytica*, the percentages of infection for the several classes of cases are as follows :—In the 527 cases of dysentery, 26·5 ; in the 51 cases of other intestinal complaints, having a previous history of dysentery, 19·6 ; in the 159 cases of other intestinal complaints, not having any history of dysentery, 19·5 ; in the two cases of liver abscess, 50·0 ; of the 25 cases of other ailments, having a previous history of dysentery, 32·0 ; and of the 70 cases of other ailments, not having any history of dysentery, 20·0.

Of the 230 (23·7 per cent. of the whole 971) instances of *E. histolytica* infection, amoebae only were found in 17 and cysts in 213. In 99 cases the cysts were over 10$\mu$ in diameter, in 95 cases under 10$\mu$, and in 19 cases both these kinds. Of the 99 cases passing only the larger cysts, 64 had been "in the East" ; of the 95 cases passing only the smaller cysts, 36 had been "in the East," and of the 19 cases passing both kinds, 10 had been "in the East." These observations are in accord with those of MACKINNON, which also suggest that amoebae that form large cysts are commoner "in the East."

A. A.

i. BOECK (William C.). **The Thermal Death Point of the Human Intestinal Protozoan Cysts.**—*Amer. Jl. Hyg.* Baltimore. 1921. July. Vol. 1. No. 4. pp. 365–387.

ii. ——. **On the Longevity of Human Intestinal Protozoan Cysts.**—*Ibid.* 1921. Sept.–Nov. Nos. 5 & 6. pp. 527–540. With 1 text fig.

i. In determination of resistance, the cysts, after being strained out and washed, were placed with a small amount of water in serology test-tubes and exposed to gradual (2° C.) increases of temperature in a water bath for a term of five minutes at each increase. Neutral red solution was used for testing vitality.

The thermal death-point for the several species of cysts was determined to be as follows :—*E. histolytica*, 68° C. ; *E. coli*, 76° C. ; *Iod. bütschlii*, 64° C. ; *End. nana*, 64° C. ; *Giardia intestinalis*, 64° C. ; *Chilomastix mesnili*, 72° C. All these temperatures are, of course, subject to a correction of something inside 2° C.

ii. "Immersed in distilled water, contained in bottles and kept at a temperature of 12° to 22° C., cysts of *E. histolytica* were found viable at the end of 153 days ; *E. coli* at the end of 244 days ; *Giardia intestinalis* at the end of 32 days ; and *Chilomastix mesnili* at the end of 187 days.

"In eosin-stained wet preparations, sealed with vaseline, cysts of *E. histolytica* were viable at the end of 211 days; *E. coli*, 124 days; *Giardia intestinalis*, 66 days; and *Chilomastix mesnili* at the end of 232 days."

In all these experiments it is assumed that the cysts which did not stain with eosin, and showed little or no plasmolysis or loss of refractivity, were alive; this is the only criterion of vitality applied.

A. A.

BRUG (S. L.). **Opzending van materiaal ter onderzoek op darmprotozoën.** [The Sending of Material to be examined for Intestinal Protozoa.] —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 5. pp. 574–577.

The necessity of examining always fresh material very often gives rise to difficulties in practice, especially if the samples have to be sent some distance to a laboratory. Wet fixation of slides in sublimate-alcohol is too elaborate.

The author recommends mixing 1 cc. of faecal matter with 10 cc. of iodine solution (I 1, KI 2, Aq. 100), and shaking the mixture for a few minutes. Bloody mucus is well dissociated in this way. Different stages of protozoa could be recognized after keeping the sample for at least a fortnight in a well-closed bottle. The suspension must be sifted through gauze, and it is often necessary to remove the iodine by treating the filtrate with 1 per cent. sodium hyposulphite (till the yellow colour has disappeared). After centrifuging the suspension the sediment can be examined.

The method was tried with good results in cases of infection with *Entamoeba histolytica* (all stages), cysts of *Endolimax williamsi* (iodine cysts) and cysts of Lamblia. Cysts of *Endolimax nana* could not be recognized after two days. The method has a few drawbacks (impossibility of examining in eosin, pictures different from the fresh protozoa), but it may be useful in certain circumstances.

W. J. Bais.

YAKIMOFF (W. L.) & MILLER (G. A.). **Les protozoaires de l'intestin de l'homme en dehors de l'organisme de l'homme. L'examen de l'intestin du** *Periplaneta orientalis.* *Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 8–9.

This paper contains statistics of the organisms found in the intestine of *Blatta orientalis* in an investigation of 124 specimens at Petrograd. The species found were *Nyctotherus ovalis*, *Entamoeba blattarum*, *Lophomonas blattae* and *striata*, Oecomonas, Monas, Spirochaeta, Spirillum, Blastocystis, and *Oxyuris diesingi*.

A. A.

YAKIMOFF (W.) & KOLPAKOFF (F. A.). **Les colites de l'homme dues aux Protozoaires.** *Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 548–554. With 8 text figs.

Abstracts of ten cases of more or less acute dysentery among Russian soldiers, in which various protozoa were observed in, or cultivated from, the stools—namely, Prowazekia (five cases), Oecomonas (one case), Colpoda (two cases), *Uronema caudatum* (one case), *Entamoeba coli* (three cases), *Entamoeba dysenteriae* (one case). [The first four

of these are either free-living forms or belong to DOBELL's coprozoic fauna, but the author considers that they play a part in the intestinal troubles noted.] "*Prowazekia Ninae Kohl-Yakimov*" and "*Pararhizomastix hominis*" are also described as intestinal parasites of man, the latter as a "new genus"

A. A.

CRAIG (Chas. F.). **The Differential Diagnosis of the Common Intestinal Amoebae of Man.**—*Milit. Surgeon.* 1921. Nov. Vol. 49. No. 5. pp. 513–527.

The three common species, *Entamoeba histolytica*, *E. coli*, and *Endolimax nana* (which last the author prefers to retain in the generic idea "Entamoeba") are here defined and compared in their free and encysted phases, and in their relations to their human host; and the methods of preparing them for examination in the living state, and of fixing and staining them, are described.

A. A.

COLE (A. F.). **Report on Differential Blood Counts and their Value in Protozoal Infections.**—*China Med. Jl.* 1921. Sept. Vol. 35. No. 5. pp. 450–452.

This report is based on observations of 120 cases of "pensioners drawing allowances for past infections with malaria (all types)." In 53 of the cases the percentage of large mononuclears was 8 or more, in 43 cases 10 or more, and in 23 cases 12 or more. Of 20 cases where counts were done at intervals and the patients were "presumed to be taking 10 gr. of quinine" daily in a single dose before breakfast, the percentage of large mononuclears actually increased in 10, remained constant in 2, and decreased in 8. Of three cases showing B.T. parasites at first blood examination, successive counts revealed a decrease of large mononuclears from 19 per cent. to 4 per cent. in one, an increase from 6 per cent. to 10 per cent. in another, and no change in the third.

The average differential leucocyte count of the 120 cases was as follows: polymorphonuclears, 61 per cent.; large mononuclears, 8 per cent.; all other mononuclears, 31 per cent. As regards the influence of quinine on the leucocyte count the author is disinclined to form any conclusions where no certainty exists that the quinine was actually taken.

The author's final opinion is that the large mononuclear count is of no real value as an indication of malarial relapse or latent infection.

Some "cases with dysenteric history" studied at the same time gave an average differential leucocyte count as follows: Polymorphonuclears, 60 per cent.; large mononuclears, 9 per cent.; all other mononuclears, 31 per cent. So that the author is of opinion, furthermore, that the percentage of large mononuclears is not necessarily high in undoubted cases of protozoal invasion.

A. A.

HEGNER (R. W.). *Cytamoeba bacterifera* **in the Red Blood Cells of the Frog.**—*Jl. Parasit.* 1921. June. Vol. 7. No. 4. pp. 157–161. With 8 text figs.

This paper is intended to call attention to the problematical parasite of the red blood cells of frogs described by LABBÉ.

A. A.

DESCHIENS (Robert). **Les entérites à** *Giardia* (*Lamblia*). – *Travail du Laboratoire de Parasitologie de la Faculté de Médecine de Paris.* pp. 83. With 3 plates. 1921. Paris : Imprimerie Jehlen. [Price not stated.]

This is a formulated, comprehensive and critical study of Giardia (Lamblia) in all its relations, and is particularly distinguished by its experimental contribution to the evidence *for* the pathogenic character of the organism. This evidence, which is recorded in very complete detail, may be summarized as follows :—

Four cats—carefully determined to be normal as to their alimentary tract and gastric-juice—were fed, two on cysts of *G. muris*, and two on cysts of *G. intestinalis* (which the author considers to be " homologous ") ; in every case a severe dysentery followed, which in three instances was fatal on the tenth to twelfth day after the infective feed. Observation of the faeces revealed a first appearance of cysts on the third or fourth day ; a first appearance of free flagellates on the fourth day or later ; and first evidences of intestinal derangement on the third to fifth day. In the fatal cases more or less extensive bloody effusions and erosions were found, along with free forms of the parasite, in the small intestine to and beyond the caecum ; in one case the ulcerations were particularly deep and extensive, and free forms were found abounding through the entire intestinal tract.

Two cats received intra-rectal injections of free forms of *G. muris* : one died on the fifteenth day, and the other was still under observation on the sixth day ; the evidences of infection and intestinal disorder appeared on the fourth to fifth day.

Out of five mice—all free from *G. muris*—fed with cysts of *G. intestinalis*, four became infected and died with intestinal inflammation ; and one was refractory. But five mice, all naturally infected with *G. muris*, showed no reaction when fed on cysts of *G. intestinalis*.

Of five " negative " mice infected with cysts of *G. muris* after passage through a cat, four were gravely or mortally infected, and one was tolerant.

Five " positive " mice reinfected with *G. muris* gave no reaction.

Among other matters of interest, the blue cysts of *Giardia* infection are discussed ; there appears to be some relation between them and the active multiplication of free forms, and it is suggested that they may be empty cysts which have germinated in the intestine.

A. A.

REVERDIN (Hebert) & CHOMÉ (Emile). *Lamblia intestinalis. Rev. Méd. de la Suisse Romande.* 1922. Feb. Vol. 42. No. 2. pp. 118–119.

A case of chronic diarrhoea said to be due to the presence of " a rare parasite "—*Lamblia intestinalis.*

The patient was a robust man of 57 years, who from the age of 22 had been subject to chronic gout. In the Colonies, 27 years before, he had been attacked with acute dysentery, and had passed seven or eight yellow, foetid, liquid, painless stools daily ever since. Amoeba cysts were searched for, but in vain ; all that was found were free and encysted forms of *Giardia intestinalis.*

The case was treated with novarsenobenzol, by an intravenous injection every three days for a term of fifteen days (amount not stated), concomitantly with Khossum, animal charcoal, and bismuth salicylate

by mouth. The flagellates disappeared the day after the second injection of novarsenobenzol and have not been seen since; after their disappearance some smaller cysts of a different kind were noticed in the stools for some time, but these, too, subsequently disappeared.

Since the disappearance of the flagellates the patient has increased in weight, and passes not more than three or four stools daily.

A. A.

YAKIMOFF (W. L.), SOLOWZOFF (A. S.) & WASSILEWSKY (W. J.). *Oicomonas granulata* **n. sp., parasite de l'intestin de l'homme.** —*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 546–548.

The flagellate here described was cultivated from the stools of three patients suffering from diarrhoea at Petrograd. One appears to have been a case of simple diarrhoea, which recovered; the other two cases were declared at the post-mortem examination to be, one of them glandular tuberculosis with ascites and ulcerous colitis, the other hepatic cirrhosis with anasarca, ascites and haemorrhagic colitis. The author does not go so far as to say that the new species of Oecomonas was the cause of the intestinal symptoms, but thinks that it was a not indifferent influence in their pathology. Subsequently, the organism was cultivated from the straw of the patients' mattresses. [The possibility of the flagellate being merely adventitious or "coprozoic" is not considered.]

A. A.

BROUGHTON-ALCOCK (W.) & THOMSON (J. Gordon). *Embadomonas intestinalis* **(Wenyon and O'Connor), 1917; Description of the Cysts and Free Forms found in a Case in England.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.) 1922. Feb. Vol. 15. No. 4. pp. 8–13. With 46 figs.

The flagellar and encysted forms of *Embadomonas intestinalis* as observed by the authors are here described and figured. The parasites were found in great quantity in the stools of a man, aged 54, who had lived in the Far East for 27 years, had been treated for dysentery there and passed stools in which *Entamoeba histolytica* was found, and had come back to England about two years afterwards in poor health as a case of mucous colitis that had been at first wrongly diagnosed as sprue. The definite history of *E. histolytica* infection in the past renders any conclusion as to the part played by Embadomonas in the present uncertain.

A. A.

SANGIORGI (Giuseppe). **Di un flagellato dell' intestino umano** (*Pirobodo intestinalis* **n. sottog. e sp.).**—*Pathologica.* 1922. Feb. 1. Vol. 13. No. 317. pp. 69–71. With 5 figs.

Figures and descriptions of both free and encysted forms of a piriform flagellate found in cases of diarrhoea in Albania and named *Bodo* (*Pirobodo*) *intestinalis*, n. subgen. and sp.

A. A.

FRANCHINI (G.). **Sur les flagellés intestinaux du type** *Herpetomonas* **du** *Chamaeleon vulgaris* **et leur culture, et sur les flagellés du type** *Herpetomonas* **de** *Chalcides* (*Gongylus*) *ocellatus* **et** *Tarentola mauritanica.*—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 641–645.

As the three kinds of lizards here specified eat insects (usually flies) and these commonly harbour intestinal flagellates, it is probable that

the flagellates found in the gut of the lizards came originally from insects. Sometimes these flagellates can get from the lizard's gut into the lizard's blood and organs. In a case here described, two young mice fed on slime and scrapings from the cloaca of a chameleon harbouring flagellates, developed a mild general infection. A paper more speculative than critical.

A. A.

PATTON (W. S.). **Studies on the Flagellates of the Genera** *Herpetomonas, Crithidia* **and** *Rhynchoidomonas.* **No. 7. Some Miscellaneous Notes on Insect Flagellates.** *Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 230–239. With 3 plates.

The failure during many years to detect flagellates in the intestine of any of the bloodsucking species of Musca of Madras, and their recent discovery in *Musca bezzii* in the Nilgiri Hills, is noted. This flagellate (found in the intestine of *Musca bezzii*) is described and figured as a new species—*Herpetomonas craggii*; its entire life-history appears to be passed in the adult fly.

The occurrence of *Herpetomonas mirabilis* Roubaud in several species of Calliphorines is noted; some of its stages are crithidiform, or even almost trypaniform. The occurrences of *H. muscae domesticae* Burnett, in numerous species of Muscidea; of *H. sarcophagae* Prowazek, in many species of Sarcophaga; and of an unnamed Crithidia and an unnamed Herpetomonas in Sepsid flies are noted.

In the author's experience, the intestinal Herpetomonads of dung- and carrion-feeding flies tend to be specific to a particular host, rather than common to numerous species of hosts.

A. A.

FRANCHINI (G.) **Sur un flagellé de Lygoeide** (*Crithidia oxycareni* **n. sp.).**—*Bull. Soc. Path. Exot.* 1922. Feb. 8. Vol. 15. No. 2. pp. 113–116. With 1 text fig.

Figures and descriptions of the various forms of *Crithidia oxycareni* and new species of flagellate found in the digestive tube, salivary glands, beak, and also in the faeces, of a small Lygaeid bug, *Oxycarenus lavaterae*, swarming in certain bushes of a Mallow, *Althaea syriaca*. Forms from the digestive tube were inoculated into the peritoneum of a white mouse, and when the mouse—very sick—was killed 24 days afterwards, scanty free leishmania-forms were found in smears of blood, liver, spleen, and marrow. In two of the plants examined, leishmania-forms were not rare. The plant is probably infected by means of the insect's faeces.

A. A.

KOIDZUMI (Makoto). **Studies on the Intestinal Protozoa found in the Termites of Japan.**—*Parasitology.* 1921. Aug. 31. Vol. 13. No. 3. pp. 235–309. With 6 plates and 5 text figs.

Weird denizens of an obscure world, the flagellate protozoa inhabiting the intestine of the termites that feed on wood are an enigma, a riddle within a puzzle. As the fabled monsters that sprang from the union of Typhon and Echidna, they are unlike anything of their kind, the only other creature at all approaching them being Lophomonas from the gut of the cockroach. Every species of termite has its own specific kinds of flagellates, and all these proper specific kinds of flagellates are commonly found—and in great numbers—in every individual termite of the proper species. At first these termite-flagellates were

incontinently styled "parasites," but really they seem to be the exact converse of parasites; for, although filling their host's gut, they do not rob their host of nutriment, but are said to provide nutriment for the host by converting the inert dry wood swallowed by the host into soluble material—sugar and glycogen, according to BUSCALIONI and COMES—meet for the host's service. Thus, rather than unnecessary and unprofitable endoparasites, they are indispensable paying guests of the guild of archimagirus; and the association between these two rather mysterious animals appears to be a perfection of symbiosis unparalleled in the strictly animal domain.

From the "medical" standpoint, these flagellates not only present new and illuminating conceptions of "parasitism" in general and of intestinal "parasitism" in particular, but they also suggest clues to arcana of physiology and pathology; and altogether they are so alluring to the medical man, that no apology is necessary for drawing attention to them and to this paper which contains, among other things, a guide to the literature relating to them in a journal of tropical medicine.

*Teratonympha mirabilis* var. *formosana* Koidzumi, occurring in *Leucotermes flaviceps* in Formosa. Measures 200–250 $\mu$, but sometimes 300 $\mu$ or more, in length, and 40–50 $\mu$ in width at the widest portion.

[Reproduced by permission from *Parasitology*.]

It may be added that the remarkable ciliate protozoa found in the stomach of sheep and other Ruminants, have also been supposed to play some necessary part in breaking up cellulose as a preliminary to the proper digestive operations of their hosts.

A. A.

i. FRANÇA (Carlos). **Sur deux Phytoflagellés** (*L. Elmassiani* **Migone et** *L. Bordasi* **sp. n.**).—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. May. Vol. 1. No. 2. pp. 245–254. With 4 figs.

ii. . **Encore quelques considérations sur la Flagellose des Euphorbes.** —*Bull. Soc. Path. Exot.* 1922. Mar. 8 Vol. 15. No. 3. pp. 166–168.

iii. FRANCHINI (G.). **Sur un flagellé nouveau du latex de deux Apocynées.**—*Ibid.* Feb. 8. No. 2. pp. 109–113. With 1 text fig.

iv. . **Flagellose du chou et des punaises du chou.** *Ibid.* Mar. 8 No. 3. pp. 163–165. With 1 text fig.

i. The two species of *Leptomonas* here described occur as parasites of S. American Asclepiads. *L. elmassiani* has also been observed in a bug (*Oncopeltus luctuosus*) that lives on the fruit of its plant-host (*Funastrum bonoeriensis*).

The account is prefaced with a criticism of WENYON's classification of this group of Flagellates.

ii. Refers to FRANCHINI's discovery of a trypanosome living in the latex of Euphorbias. Contraverts FRANCHINI's statement that the bug Stenocephalus transmits the flagellosis of Euphorbias because the flagellates of the plant also occur in the bug's intestine and beak. States that the infection is transmitted from the bug to the plant by curious metacyclic forms of the flagellate that occur in the insect's salivary glands. Thinks that analogous metacyclic forms of *Leishmania donovani* will be discovered by Mrs. ADIE in the bed-bug.

iii. *Herpetomonas funtumiae*, parasitic in the Apocynaceous plant *Funtumia elastica*, is here described and figured in its varied forms. It was found free in the latex, and sometimes also enclosed in a sort of "cell," in one of four plants of that species at the Florence School of Agriculture. In a specimen also of *Thevetia nereifolia*—another Dogbane—growing near the parasitized Funtumia scanty non-flagellar forms of the parasite were found. References are given to previous discoveries of Flagellates in Asclepiads and Dogbanes.

iv. The author has found, at Bologna, cabbages infested with Pentatomid bugs (*P. ornatum* and its variety *pectorale*, *P. oleraceum*, and *Aelia acuminata*) which were infected as to the gut and faeces and to a slight extent also the salivary glands and beak, with a Crithidia and a Herpetomonas. The cabbages also were to a slight extent infected. Leaves on which the bugs were abundant withered and died.

A. A.


i. YAKIMOFF (W. L.), WASSILEWSKY (W. J.), KORNILOFF (M. T.) & ZWIETKOFF (N. A.). **Flagellés de l'intestin des animaux de laboratoire.** —*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 558–564. With 1 fig.

ii. FAUST (E. C.). **A Study of Trichomonas of the Guinea-Pig from Peking.** —*Arch. f. Protistenk.* 1921. Vol. 44. No. 1. pp. 115–118. With 1 plate and 1 text fig.

iii. ——. **The Human Trichomonas in North China.**—*Amer. Jl. Hyg.* Baltimore. 1921. July. Vol. 1. No. 4. pp. 410–418. With 1 plate.

iv. YAKIMOFF (W. L.) & SOLOWZOFF (A. S.). **Le *Chilomastix mesnili* Wenyon en Russie.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 556–557.

v. FRANCHINI (G.). **Au sujet de la culture de l'*Herpetomonas* du *Pyrrhocoris apterus*.**—*Ibid.* 1922. Mar. 8. Vol. 15. No. 3. pp. 161–163. With 1 text fig.

vi. SIMON (Charles E.). *Giardia enterica*: **A Parasitic Intestinal Flagellate of Man.**—*Amer. Jl. Hyg.* Baltimore. 1921. July. Vol. 1. No. 4. pp. 440–491. With 2 text figs., 12 charts and 3 plates.

vii. YAKIMOFF (W. L.) & SOLOWZOFF (A. S.). *Monas* **sp. dans les selles de l'homme.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. p. 557.

viii. LAVIER (G.). **Flagellés parasites intestinaux du campagnol indigène *Microtus arvalis* Pallas.**—*Ibid.* Dec. 14. No. 10. pp. 710–717. With 5 text figs.


i. Descriptions of flagellates from the intestinal contents of white mice, guinea-pigs and rabbits. *Sphaeromonas rossica* from the guinea-pig and *Piromonas rossica* from the rabbit are proposed as n. spp.

ii. *Trichomonas flagelliphora* from the guinea-pig is described and figured as a n. sp., and is compared with *T. caviae* (Davaine) from the same animal. Thousands of specimens were to be seen in every coverglass preparation.

iii. The Trichomonas of this paper is named, without prejudice, *T. hominis*. Nothing new is disclosed

iv. Note of four cases of diarrhoea, in Petrograd, with *Chilomastix mesnili* in the stools.

v. Describes the culture of this Herpetomonas on rabbit's blood-bouillon (six drops of blood to 6 cc. bouillon) at 24° C.

vi. The chief features of this paper are the biometric tables and curves, and some reproductions of figures of earlier authors from LAMBL to WENYON and O'CONNOR.

vii. Note of the finding of a Monas in the stools of a patient having diarrhoea.

viii. Of three flagellates of the field-vole here noticed and figured—Giardia, *Octomitus muris* and *Trichomonas muris*—the first is extremely like *Giardia intestinalis*, though the author hesitates to identify it with that species.

A. A.

BROUGHTON-ALCOCK (W.) & THOMSON (J. Gordon). *Eimeria oxyspora*, **Dobell, 1919, found in a Specimen of Human Faeces in England.** —*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.). 1922. Feb. Vol. 15. No. 4. pp. 1–7. With 6 figs.

Oocysts of *Eimeria oxyspora* observed by the authors are here described and are figured in all stages of development.

The patient in whose faeces they were found is a Londoner, aged 30, who has always lived in England, except for short holiday visits to the Continent and a two months' stay in Malta last year. He came up for treatment for digestive disturbance, debility and constipation; there had not been diarrhoea. His diet for some days before the finding of the oocysts had not contained meat or any obvious form of fat. In the faeces, besides the specific oocysts, *E. coli* cysts and eggs of *Trichocephalus dispar* were found and many particles of fat, but not blood or mucus or any pathological exudate or culturable organism.

The specific oocysts were found in all stages of development from early forms containing a single mass of granular protoplasm to fully ripe forms containing four sporocysts, each with two sporozoites. In diameter the oocysts ranged from 33·6$\mu$ to 50·6$\mu$, and mainly from this variation in size the authors suggest that DOBELL's *E. swydersi* may be a variety of *E. oxyspora*.

A. A.

i. CAUCHEMEZ (L.). **Fréquence de la Coccidie du porc (*Eimeria Brumpti*, n. sp.), en France.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 645–648. With 1 text fig.

ii —. **Au sujet du nom spécifique à donner a la Coccidie du porc.** *Ibid.* 1922. Mar. 8. Vol. 15. No. 3. pp. 160–161.

i. Veterinary writings contain but few references to coccidiosis of the pig, and some of these are but perfunctory. The author has lately made a rather extensive study of pig faeces and has frequently found oocysts of an Eimeria in them. He has studied these oocysts and followed their maturation outside the host, and he has infected sucking pigs by feeding them with the ripe cysts. Investigation of the viscera of infected pigs does not reveal any macroscopic lesion, and pigs passing oocysts in abundance are in perfect health.

The oocysts differ from those occurring in man, in the rabbit, and in cattle, and are here described and figured as those of a new species, *Eimeria brumpti*.

ii. The author has discovered that *Eimeria brumpti* has been described (Feb. 1921) by NÖLLER as *E. suis*, and by DOUWES (Jan. 1921) as *E. Debliecki*. This last name, therefore, has priority.

A. A.

SERGENT (Etienne & Edmond). **Etude expérimentale du paludisme des oiseaux. Un même lot de moustiques peut infecter successivement 3 sujets.**—*C.R. Soc. Biol.* 1922. Feb. 18. Vol. 86. No. 7. pp. 349–350.

In a first series of experiments :—

A canary was bitten by nine Culex infected with *Plasmodium relictum* a month before ; result, a heavy infection.

A second canary was bitten, 15 days afterwards, by three of the Culex that had bitten the first canary : result, a feeble infection difficult to detect.

A third canary was bitten by one of the Culex that had bitten the second canary a month before and also the first canary a month and 15 days before : result, no infection.

In a second series of experiments :—

A canary was bitten by three Culex infected with *P. relictum* a month and a half before : result, strong infection.

A second canary was bitten, 10 days afterwards, by the same three Culex : result, slight infection.

A third canary was bitten by one of the Culex that had bitten the second canary 10 days before and the first canary 20 days before : result, a slight infection ending, however, in a fatal pernicious access.

A. A.

FRANCHINI (G.). *Haemoproteus Chelidonis* **chez l'hirondelle** *Chelidon urbica* **Linn. Stades probables de développement chez la puce** *Ceratophyllus hirundinis.*—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 13–18. With 3 text figs.

The author describes and figures the endoglobular and free forms of a parasite of the genus *Haemoproteus* found in the common swallow in Italy. The forms found by him in the blood include endoglobular young forms and full-grown crescents, exflagellating microgametocytes, microgametes and ovoid and globular macrogametes, and ookinetes ; the forms found by him in the lung include ookinetes, sporoblasts, and free sporozoites.

In the nests of the swallow the flea, *Ceratophyllus hirundinis*, is abundant, and in the mash of the flea the author has found rounded and crescentic forms similar to some found in the swallow, and cysts of different sizes full of small, round or oval, nucleate or non-nucleate, parasites amid vacuoles and masses of pigment.

The author describes and figures what he has seen, and is [as one would suppose] doubtful and uncertain in his inferences. He is not quite sure but that what he has seen in the flea are developmental stages of a gregarine proper to the insect.

A. A.

KUDO (R.). **Studies on Microsporidia Parasitic in Mosquitoes. II. On the Effect of the Parasites upon the Host Body.**—*Jl. Parasit.* 1921. Dec. Vol. 8. No. 2. pp. 70–77. With 1 text fig.

A useful paper, with a list of species and some references of historic interest. A new Microsporidian, *Thelohania opacita* parasitic in the larva of *Culex apicalis* is described. A. A.

MACARTHUR (W. P.). **A Holotrichous Ciliate Pathogenic to** *Theobaldia annulata* **Schrank.**—*Jl. Roy. Army Med. Corps* 1922. Feb. Vol. 38. No. 2. pp. 83–92. With 5 text figs.

The Holotrichous Ciliate, allied to Cyclidium and Pleuronema, here described and figured, was found swarming in the body-cavity of 22 out of 87 larvae and pupae of *Theobaldia annulata* caught near Blackpool in the month of October. Of the infected insects two were alive when their infection was observed, and died subsequently; the other 20 were already dead. As many as 1,000 ciliates might be found in an individual larva, but none could be found in the water from which the larvae were taken. A constant feature of the infection was destruction of the host's eyes, and in one instance the ciliates were watched attacking these organs.

The ciliates vary considerably in size and shape, and three forms are figured, namely (1) small forms with a long "tail," a long cytostome, and long peristomial cilia; (2) larger, intermediate, forms with a short "tail," a shorter cytostome, and shorter peristomial cilia; and (3) still larger forms without "tail," and with a shorter and more antero-lateral cytostome and periostomial cilia of no extraordinary development. The three stages of this species, as WENYON and the author remark, seem to link the genera *Uronema*, *Cyclidium*, *Pleuronema*, and *Glaucoma*, and to suggest that all four might possibly be included in a single generic concept. A. A.

YAKIMOFF (W. L.). **Sur la question de l'** *Uronema caudatum* **Martini.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 555–556.

The author has found *Uronema caudatum* four times—in Petrograd—variously associated with other protozoa, and is, therefore, unable to give any opinion on the possibility of its specific pathogenicity. [On "Uronema caudatum," see DOBELL and O'CONNOR, "The Intestinal Protozoa of Man," p. 116, where it is conjectured to belong to a genus (Cyclidium), species of which are common in water and infusions of all sorts all the world over.]

A. A.

i. ITURBE (Juan). **Sobre algunos datos de Protozologia y Parasitologia, recogidos en San Juan de los Morros.**—*Contribución del Laboratorio Iturbe en el 3er Congreso Venezolano de Med.* 1921. pp. 3–8. With 1 plate. Also: *Gac. Med. de Caracas.* 1921. Sept. 30. Vol. 28. No. 18. pp. 275–277. [With GONZALEZ (E.).]

ii. YAKIMOFF (W. L.). **L'examen des eaux courantes à Pétrograd.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 12–13.

iii. ——. **Les protozoaires et les infections de l'intestin en Transcaucasie.**—*Ibid.* 1921. Dec. 14. Vol. 14. No. 10. pp. 649–652.

——. **Les protozoaires des animaux domestiques en Transcaucasie.**—*Ibid.* p. 652.

iv. LAVIER (Georges). **Hémogrégarines,** *Grahamella*, **Spirochète et Trypanosome du campagnol indigène** *Microtus arvalis* **Pallas.**—*Ibid.* Nov. 9. No. 9. pp. 569–576. With 5 text figs.

i. In these notes are described and figured (1) *Plasmodium gonzalezi*, n. sp., in the blood of the Iguanid lizard, *Anolis biporcatus*; (2) *Cercaria*

*guariquensis*, n. sp., parasitic in *Melania venezuelensis*. Record is also made of the occurrence of a microsporidian parasite, probably *Thelohania legeri*, in the larva of *Aëdes pipiens*, and of trematode larvae encysted in the muscles of certain fishes.

ii. The author here notes the occurrence of *Prowazekia Ninae Kohl-Yakimoff* and *Uronema caudatum* in the waters of the Neva, and from it he draws an inference very different from that which would be suggested to readers of the latest information on the subject of the pathogenesis of the intestinal flagellata.

iii. Statistics of laboratory examinations of faeces in Transcaucasia. "*Vahlkampfia Ninae Kohl-Yakimoff*" is mentioned as a new species.

iv. Of the four blood parasites of the vole here described, two, *Grahamella microti* and *Trypanosoma microti*, are new spp.

A. A.

RILEY (William A.). **Some Little Emphasized Guide-Posts to Medical Entomology.**—Reprinted from *Annals Entom. Soc. of America.* 1921. Sept. Vol. 14. No. 3. pp. 159–168.

This interesting essay is based upon the old, old theme, that with all of us in all things and at all times—even with those few who make their way into new domains, or soar above the beaten tracks of thought—a mighty host of intelligent predecessors is still working, even though most of them may be forgotten. The author's object is to remind us that the wonderful discovery of the connexion between mosquitoes and malaria, and other discoveries that followed hard upon it along the same line, all rest upon the labours of a long train of worthy pioneers, starting in the seventeenth century with LISTER and SWAMMERDAM, and their respective discoveries that a Gordiid worm passed some part of its life in an insect, and that the things in after time known as rediae lived in a pond-snail and produced the tadpole-like objects known to later times as cercariae. The author mentions many other names and facts of great historic moment, for which he deserves our thanks; for the constant remembrance of our immense debt to our great predecessors can never make us insensible of our obligations to our great original contemporary minds. The author does well also in exposing from the historic standpoint the pitiful ignorance of the robustious fellows who scorn the science that has not an obvious utilitarian trend, and the pitiful oblivion of the worker who thinks to encase his subject and entomb himself in his own independent tabernacle.

A. A.

WELLS (R. W.), BISHOPP (F. C.) & LAAKE (E. W.). **Derris as a Promising Insecticide.**—*Jl. Econom. Entom.* 1922. Feb. Vol. 15. No. 1. pp. 90–96.

Powdered derris-root is here said to be destructive to Mallophaga on fowls and cattle, though not so good as sodium fluoride; very effective against Anoplura on cattle and dogs; and very remarkably destructive to fleas on dogs and cats. It is sufficiently effective against lice and fleas when diluted with an excipient.

A. A.

CLELAND (J. Burton). **Insects and Their Relationship to Injury and Disease in Man in Australia.—No. II.**—*Australasian Med. Congress. Transactions of the Eleventh Session held in Brisbane, Queensland, 21st–28th Aug., 1920.* pp. 258–265.

This paper contains the following among other addenda to an original paper of the same title read by the author at the Australasian Medical Congress of 1911 held in Sydney :—

Of *Earwigs.*—The wound inflicted by the W. African *Dacnodes wellmani* (as is well known) draws blood, and may become severe, probably through septic infection : that of the Australian *Anisolabis colossea* is said to have similar effects.

Of *Ants.*—The bite of "bulldog" ants (*Myrmecia* spp.) gives much pain, and may cause numbness, swelling, and lymphangitis, and even shivers and vomiting ; a man bitten simultaneously by many died from formic acid poisoning. The bite of the tree-ant (*Oecophylla smaragdina*) is very painful [the ferocity of this species and the severity of its bite are notorious in India].

Of *hairy caterpillars and cocoons.*—The Australian species *Euproctis edwardsi, Ocinara lewinae* and *Teara* sp. are mentioned as causing a severe and sometimes persistent rash.

Of *Diptera.*—Myiasis of ear, due in one case to *Lucilia* maggots, and myiasis of perinaeum in an obstetric case. Numerous records of bites and annoyance from sandflies (probably Culicoides), Simulium, mosquitoes, Tabanidae, and "flies." Reference to CUMPSTON'S "History of Smallpox in Australia," p. 35, for an account of smallpox infection supposed to have been conveyed by flies. Records of flies found in pan-closets are numerous.

Of *Bed-bugs and Lice.*—Reference to the prevalence of bed-bugs in Sydney Hospital during the fifties or sixties of last century. Reference to a case of phthiriasis of eyelids—species about one-third the size of *P. inguinalis.*

A. A.

SINTON (J. A.). **Entomological Notes on Field Service in Waziristan.**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 575–585.

*Phlebotomus papatasii, P. minutus* and its var. *antennatus*, and *P. sergenti* ; and *Anopheles turkhudi, culicifacies, funestus* var. *listoni, rhodesiensis, fuliginosus, rossi, maculipalpis, stephensi, pulcherrimus* and *nursei* have been found by the author in Waziristan.

A. A.

LANGERON (Maurice). **Deuxième mission parasitologique en Tunisie Tamerza (septembre–octobre 1919).**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Dec. Vol. 1. No. 4. pp. 347–382. With 10 text figs.

The geological features and the noxious elements of the fauna of the three contiguous oases of Tamerza, Mides, and Chebika are here described. Ankylostomiasis and bilharziasis were not discovered and the molluscan fauna appears to be unfavourable to the existence of the latter disease. An isolated house 4 km. distant from Tamerza was found to be a focus of Oriental sore ; but in only two of a dozen geckos captured there was a Leptomonas found by culture, and the search for intestinal flagellates in the bloodsucking arthropods of the vicinity was entirely unsuccessful. These included *Anopheles*

*hispaniola* and *culicifacies*, five species of Culicini, *Phlebotomus minutus*, *fallax*, *papatasii* and *sergenti*, *Culicoides langeroni*, *Cimex lectularius*, and *Argas persicus*, which last does not seem to touch man. The larvae and pupae of Anopheles were observed to be flourishing in a superficial liquid mud, or "bouillie sableuse," formed along a line of seepage.

The author deals at some length with the synonymy of *Anopheles culicifacies*, *hispaniola* and *multicolor*. *A. culicifacies* can be distinguished from *turkhudi*, *multicolor* and *hispaniola* by larval characters here described and figured. *A. hispaniola*, besides having its own specific larval characters here described and figured, differs from *turkhudi* in its egg. The larval characters of *Culex laticinctus* and *apicalis* and of *Uranotaenia unguiculata* are also described and figured.

A. A.

BOYD (J. E. M.). **The Botany and Natural History of the Dyke-Land near Sandwich, Kent, as far as they concern Medical Entomology.**—*Jl. Roy. Army Med. Corps.* 1922. Jan. and Feb. Vol. 38. Nos. 1 and 2. pp. 41–47; 117–130.

From this admirable paper, which is full of careful observations of a most interesting tract of marshland and also of useful records of laboratory work, only a few items of general significance for the sanitarian can be extracted here. The water fern, *Azolla filiculoides*, can deter Anopheles from breeding only mechanically, by completely covering and concealing the water-surface. Small entomostracous crustacea (Daphnia, Cypris, Cyclops) certainly destroy new-hatched mosquito larvae. Farms often revisited for *Anopheles maculipennis* gradually become impoverished or exhausted. A male "Stegomyia fasciata" was seen paired with a female *Culex pipiens*, though nothing resulted. Out of eggs of *Culex pipiens* kept dry for three and five days, but not longer, a certain number hatched; and out of some larvae removed from water for three hours, and pupae for five hours, but not longer, one larva pupated and one pupa hatched an imago. Cresol up to 1 in 100,000 parts dilution destroyed mosquito larvae rapidly; the effects of 1 in 250,000 parts were doubtful. Maggots of the common blowfly are active and good travellers; they (and pupae) are killed by 15 minutes exposure to a temperature of 57° C. The adult flea (*Ceratophyllus garii*) may lie quiescent in the cocoon apparently awaiting a favourable opportunity for emergence. An individual louse may bring forth 295 eggs; if well fed it may produce 10 in a day. A male louse may live 32 days, a female 46 days. Though louse eggs usually hatch in 7–10 days, the hatching of eggs in unused clothing or bedding may be delayed for five weeks; but new-hatched larvae die if they do not get a feed within 24 hours. Lice and their eggs are killed by exposure to a temperature of 60° C. for 15 minutes, or of 55° C. for 30 minutes.

A. A.

MACGREGOR (Malcolm E.). **The Influence of Drought upon Mosquito Life in Surrey.**—*Bull. Entom. Res.* 1921. Nov. Vol. 12. Pt. 3. pp. 205–209.

Careful observations of the effects of the long summer drought of 1921 in reducing the numbers of most kinds of mosquitoes in certain

parts of Surrey at least. The local species least affected were *Anopheles maculipennis*, which breeds in ponds of considerable persistence, and *Culex pipiens*, which is perhaps of all species the least dependent on natural waters. A. A.

JAMES (S. P.). **Mosquito Life in Surrey during 1921.**—*Bull. Entom. Res.* 1922. Feb. Vol. 12. Pt. 4. pp. 427–428.

The gist of this paper is that an abnormally dry summer, such as that of 1921, is not likely to lead to a permanent decrease in the mosquito population in tracts where there are waters of considerable permanence. A. A.

EDWARDS (F. W.). **A Revision of the Mosquitos of the Palaearctic Region.**—*Bull. Entom. Res.* 1921. Nov. Vol. 12. Pt. 3. pp. 263–351. With 18 text figs.

The Palaearctic species of Culicidae admitted to this catalogue are 94 in number, and include a quota of 19 Anopheles, 20 Culex and 38 Aëdes. Only two tribes of Culicinae are here recognized, namely, Culicini (including the Culex, Sabethes, and Megarhinus alliances) and Anophelini. Two new, and perhaps disputable, species of Anopheles are introduced, namely, *A. elutus* from Western Asia and Macedonia, and *A. punctibasis* from Japan.

*A. elutus*, in its larval stage, is "apparently identical" with and, in its adult stage, is not very clearly distinguishable from *A. maculipennis*, but the egg has not any conspicuous lateral floats.

*A. punctibasis* in its specifications seems not to have any definite point of distinction from *A. sinensis* (here called *hyrcanus*).

A. A.

MARTINI (E.). **Zur Bionomie unserer Stechmücken.** [Bionomy of Mosquitoes in Germany.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 11. pp. 341–347.

This paper contains a lot of laboratory notes on the development of *Anopheles maculipennis* and *bifurcatus* and *Theobaldia annulata* at different temperatures under laboratory conditions; also on the effect of prolonged cold on the eggs of *A. maculipennis*. They confirm what is well known, namely, that the hatching of the egg and the development of the larva (food being sufficient) is hastened by warmth and retarded by cold. It is noted that under all the temperature conditions tested the duration of the fourth larval stage was much longer than that of any of the preceding stages. This is a well known experience of most who have bred *Anopheles maculipennis* and *bifurcatus* in the insect-house, and may perhaps be—as MACGREGOR has suggested—merely a phenomenon of the laboratory, due to a slightly unnatural reaction of the water.

It is noted in detail that eggs of *A. maculipennis* kept in an ice-chest on damp earth for different terms—in one instance 10 days—hatched a few days after restoration to water at summer temperature; also that eggs of the same species kept in the ice-chest on damp earth for 10 days and then placed in cold water, hatched two days afterwards. Eggs hatched even when the earth on which they lay had been frozen.

It is also noted that some eggs of *A. bifurcatus* hatched after being kept on damp earth for 12 days.

A. A.

ECKSTEIN (Fritz). **Beiträge zur Kenntnis der Stechmückenparasiten.** [Parasites of Mosquitoes.]—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Apr. 13. Vol. 88. No. 2. pp. 128–135. With 1 plate and 4 figs.

Everyone who examines larvae and adults of mosquitoes occasionally finds parasites in them. The author of this paper mentions several species in which he has observed encysted Trematode parasites, and he figures a larva of *Culex pipiens* with several encysted cercariae, as well as some stages of *Distoma ellipticum* (*variegatum*) from the lungs of the fire-bellied toad.

A. A.

DAVEY (J. B.) & NEWSTEAD (R.). **Mosquitoes and Other Blood-Sucking Arthropods of the Upper Shiri River, Nyasaland.**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 457–462.

A list of mosquitoes, moth midges, gadflies, tick-flies, bugs, and ticks caught in a small area on the banks of the Shire river.

A. A.

EVANS (A. M.). **Notes on Culicidae collected in Venezuela.**—*Ann Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4 pp. 445–454. With 2 plates and 3 text figs.

A list of 16 well known species of Culicidae collected in Venezuela, with a comparison of the larvae and of the male hypopygium of *Anopheles argyrotarsis* and *albimanus*.

A. A.

LAMBORN (W. A.). **The Mosquitos of Some Ports of China and Japan.**—*Bull. Entom. Res.* 1922. Feb. Vol. 12. Pt. 4. pp. 401–409.

This is a continuation report of the Mosquito Survey of Eastern Ports commenced by Dr. A. T. STANTON (see this *Bulletin*, Vol. 16, p. 105) with the main object of defining the position of *Stegomyia fasciata*.

The ports here dealt with are Fuchow, Shanghai, Nagasaki, Kobe, and Yokohama. *Stegomyia fasciata* was not discovered in any of these ports. In all five of them *Stegomyia albopicta* Skuse (=*scutellaris*, Theob.) and *Anopheles sinensis* (here called "hyrcanus") were found, and *Culex fatigans* Wied. and *C. tritaeniorhynchus* Giles in all except Yokohama.

A. A.

BLACKLOCK (B.). **Notes on an Apparatus for the Individual Breeding of Mosquitoes.**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 473–477. With 5 text figs.

Each individual larva is housed in a glass thimble; the thimbles are sunk, up to the lip, each in a pocket dug in a slab of wood, and over the mouth of each thimble is set a short cylinder of glass, covered at top with netting, to receive the imago when it emerges. About 30 different species of larvae can thus be cared for in individual isolation on a slab of wood about a foot long and about 4½ in. broad.

A. A.

MacGregor (Malcolm E.). **The Influence of the Hydrogen-Ion Concentration in the Development of Mosquito Larvae. (Preliminary Contribution.)** *Parasitology.* 1921. Nov. Vol. 13. No. 4. pp. 348–351.

It is a common experience that many mosquito larvae do not thrive when kept in the laboratory; that they remain stunted, perhaps for months, and do not undergo any further transformation.

In breeding the British tree hole mosquitoes the author found that everything went well if they were kept in their native water, but that if water from tap, or even from pond, were added, something went wrong with them. Experiment revealed the fact that the added waters were alkaline, and that these tree-hole species could flourish only in water of a certain degree of acidity. This acidity seems to be maintained in nature by supplies of *fresh* dry leaves, etc.

In breeding *Anopheles maculipennis* and *bifurcatus* and *Ochlerotatus nemorosus*, which normally live in water of alkaline reaction, the author found, by experiment with the first-named species, that acidulation of the water was fatal—an effect which he attributes in considerable measure to the action of the parasitic fungus, *Saprolegnia*, which normally attacks aquatic insects and flourishes in an acid medium.

With commendable caution the author points out that these experiments of his, which show that an alkaline medium is unfavourable to the brood of tree-hole mosquitoes, and an acid medium unfavourable to the mosquito brood of ponds, may have a limited practical application. Undoubtedly these ingenious experiments support the proposition that in the control of any noxious animal an exhaustive study of the biological conditions is the essential preliminary.

A. A.

Roubaud (E.). **La différenciation des races zootropiques d'Anophèles et la régression spontanée du paludisme.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 577–595. With 3 figs.

The author has already [see this *Bulletin*, Vol. 16, p. 103] enunciated and constructed an argument for his proposition that in long-settled parts of Europe the concurrence of a copious Anopheline fauna with exemption from malaria (anophelisme sans paludisme) is mainly due to the female *Anopheles maculipennis* having, under propitious circumstances, completely diverted her attacks from man to cattle, and he now seeks to add precision to his argument by evidence that the insect's change of host has been accompanied by a change in the expanse of the maxilla and in the number of the maxillary denticles.

He is satisfied that he has found evidence that in places where man is the principal or the sole host, the maxillae are somewhat slenderer, and their denticles somewhat less numerous, than in places where cattle are the principal hosts but are limited in number or accessibility; and, further, that where cattle are so abundant, and so convenient of access as to be the *sole* hosts, the maxillae and their denticles are intermediate in character between the other two predicables.

The evidence offered by the author is as follows:—

1. He has examined 7 *Anopheles maculipennis* from Algeria, 8 from a locality in Corsica, and 17 from different localities in Macedonia—in all, 32 individuals from highly malarious places where the insect is said to be constant in its attention to man and to have little or nothing to do with cattle. In these insects the average number of maxillary denticles is, for the respective localities, 13, 13·6 and 14.

To emphasize the proffered evidence, the number of denticles is not more than 14 (though in 37·5 per cent. of the 8 from Corsica, and 35·5 per cent. of the 17 from Macedonia, it was "more than 14") in places where the Anopheles are man-eaters.

2. He has examined 25 *A. maculipennis* from Argonne, 25 from La Vendée, and 25 from Holland—in all, 75 individuals from more or less malarious localities where the insect is said to be distinctly addicted to cattle, though its opportunities for indulging its preference are limited or restricted. In these insects the average number of maxillary denticles is, for the respective localities, 15·5, 15·6 and 16·9. To emphasize the proffered evidence, the number of denticles is more than 15 (though in 20 per cent. of the 25 from Argonne, and in 15 per cent. of those from La Vendée, it was not "more than 14") in places where the Anopheles are potential cattle-eaters, and man-eaters only by recourse.

3. He has examined 20 *A. maculipennis* from the neighbourhood of Paris, and 25 from a locality in Savoy—in all, 45 individuals from non-malarious places where the insect is said to be quite constant in its attention to cattle, and quite indifferent or even averse to man. In these insects the average number of maxillary denticles is, for the respective localities, 14·6 and 14·9 (though in 50 per cent. of the 20 from Paris, and 44 per cent. of the 25 from Savoy, it was not "more than 14.").

In these insufficient observations the author sees the very definite action of natural selection upon a single organ of the female *Anopheles maculipennis*. His interpretation of the fact seems to be:—(1) That where the insect has no important host other than the comparatively soft-skinned animal, man, the maxillary armature is not specially affected by natural selection; but that (2) where the insect, being abundant, has opportunity, but only a limited or a restricted opportunity, for feeding on cattle, those individuals having the most numerous maxillary denticles (and thus being the best qualified for piercing a thick skin and getting a full of blood quickly) will be *naturally selected* in the competition for the more desirable though thicker-skinned host; and (3) that where the insect has unlimited opportunity and convenience for feeding on cattle, the maxillae, having attained a requisite standard of perfection, will not, in the absence of any competition for the desirable host, be further specially affected by natural selection.

In other words, the maxillae in the first case will be slenderer and less strongly serrated, in the second case will be particularly strongly serrated, and in the third case will be of an intermediate character.

The conclusion of the author's argument is that places where the formula for the maxillary denticles carried by *A. maculipennis* is less than 14 are places dangerous to man; that places where the formula is more than 15 are equally dangerous to man, because there the adaptation to cattle is imperfect; and that places where the formula is more than 14, but less than 15, are the safe localities of "anophelisme sans paludisme."

The author is so well assured of the adequacy of his slight and insecure foundation of anatomical fact to sustain the imposing weight of his conclusions, that he is not afraid to consider the practical application of those conclusions to the control of malaria. While the medical man is busy with the spleen and the blood of the human population, the entomologist will be investigating the denticular formula of the Anopheles. If the denticular formula be above 15 or below 14, the entomologist will know what steps to take, provided he can increase

or manipulate the cattle. There may even be exquisite cases where he can test the efficacy of the old remedy of "a hair of the dog that bit him"; for, as the author points out, there may possibly be circumstances where the cattle-tropism of a local breed of Anopheles may be accelerated by the refined method of introducing a breed of cattle-fast Anopheles from outside.

The author's biological argument has a rather too pronounced teleological savour to be taken very seriously.

A. A.

LANGERON (M.). **Sur l'Anophélisme et le paludisme en France.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 30–36.

In this criticism of ROUBAUD's "zootropic" theory, the following among other objections are urged :—(1) That *Anopheles maculipennis* is found in houses, and does bite man, in villages where cattle are plentiful and are lodged in low, dark, ill-ventilated sheds ; (2) that the insects may be attracted to cattle-sheds by their darkness and moisture, and not necessarily to feed on cattle ; that a remarkable reduction of malaria has occurred in Les Dombes within 35 years—a term too short for a general adaptive evolution of the insect's mouth-parts.

The author agrees with those who attribute the disappearance, or regression, of endemic malaria in France to the systematic use of quinine and the continued improvement in drainage of the soil, road construction, housing, dietary and general conditions of life. One need not deny that cattle may afford some very limited protection by attracting Anopheles away from man, but that small amount of protection is unfortunately balanced by favouring the increase of the insect.

A. A.

SERGENT (Edm. & Et.), PARROT (L.) & FOLEY (H.). **L'armature maxillaire des *Anopheles maculipennis* en pays paludéen.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 29–30. With 1 fig.

These authors cannot find any confirmation of ROUBAUD's "zootropic" theory in Algeria. They have examined 1,222 females of *Anopheles maculipennis* from the notoriously malarious plain of Bône, and find that the number of maxillary denticles ranges from 11 to 19, that the percentage of individuals having more than 14 denticles is 46·4, and that the mean general denticular formula is 14·4.

A. A

ROUBAUD (E.). **A propos des races zoophiles d'anophèles.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 36–39.

Roubaud here attempts to defend his theory, of naturally-selected cattle-eating Anopheles harmless to man, from the criticism of his French colleagues.

In answer to the objections from Algiers he says that his maxillary denticular indices were provisional and were intended merely to give a precise outline to his thoughts ; and that, after all, the difference

between the figures from Algiers and his own is not very great—only 14·4 against 14 as the denticular index of man-eating Anopheles. Then, again, the method of counting the denticles must be scrutinized.

The reply to LANGERON is an even more remarkable example of special pleading. To the objection that *Anopheles maculipennis* does actually get into houses and bite man in certain places where attractive shelters for cattle exist, the reply appears to be that only a few get into the houses whereas thousands go into the cattle-sheds. To the other objections Roubaud replies, without any obvious relevance to the theory, that the intensity of malarial infection is by no means proportional to the relative abundance of Anopheles; that malaria has not reappeared in districts of France where intensive quininization is no longer practised, although Anopheles are always abundant there; and that the cattle-raising parts of France are not particularly unhealthy, although plenty of Anopheles exist in them. He admits that the manifold operations of agriculture, quite apart from the correlated increase of stock, have had much to do with the suppression of malaria, but not so much by their hygienic influence as by their effect on the breeding-places of Anopheles. For by systematic drainage the surface waters have been concentrated in permanent ditches, ponds and canals, and this concentration has enabled the Anopheles to select breeding-places in propinquity to hosts and thus to become changed from wild insects to domestic insects. This important modification has helped to confirm the insects in their preference for animal hosts, thus to give play to natural selection. For a "wild" Anopheles, hatched-out in some remote breeding-place, can do nothing when it encounters a host but satisfy its imperious need for mere blood; whereas the domestic Anopheles, having been brought up alongside hosts, is not so blindly impelled by hunger, but chooses what it likes best.

A. A.

GRASSI (B.). [**Nuovo Orizzonte nella lotta anti-malarica (Memoria Preliminare).**]—*Riv. di Biol.* 1921. Aug. 12. Vol 3. No. 4. 45 pp. [Summarized in *Bull. Inst. Pasteur.* 1922. Jan. 15. Vol. 20. No. 1. pp. 34–37.]

This is a summary by ROUBAUD, controversial in tone, of a paper in which Grassi claims to have understood and made known, as long ago as 1901, the protective aspects of domestic animals in malarious districts. ROUBAUD contends that Grassi's explanation of the attraction of cattle sheds for Anopheles was thermotropic and not the specific protective zootropism that his own theory postulates. As Grassi in his paper regards domesticated animals as only one possible means of intervention between men and malaria he probably would not object to the argument of ROUBAUD.

A. A.

BABAULT (G.). **Observations sur l'adaptation zoophile des Anophèles en Savoie.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 564–566.

At Chindrieux, in the neighbourhood of Lake Bourget, in Savoy, the author found many larvae of *Anopheles maculipennis*, and swarms of the adults in cattle-sheds and stables, but in the course of 15 days'

search he did not find a single Anopheles in a dwelling-house. Malarial fevers which formerly were common are now unknown. The Anopheline fauna has given up man and accommodated itself to domestic animals, as ROUBAUD discovered to be the case in La Vendèe and in the neighbourhood of Paris.

A. A.

SELLA (Massimo). *Anopheles claviger*: **Observations on its Distribution in Relation to Domestic Animals and its Movements during Hibernation.**—*Internat. Jl. Public Health.* 1921. Nov.–Dec. Vol. 2. No. 6. pp. 605–616. With 4 text figs.

These observations were made in the village of Talayuela, in the province of Caceres in the south-western quarter of Spain. The inhabitants, about 700 in number, live in houses of one storey, made of masonry or of unbaked brick. Domestic animals are numerous, particularly pigs. The prevalent Anopheles is *A. maculipennis* (=*claviger*). Though it does not breed between the end of November and the end of March, it is only partially inactive during the winter, its state being described as "semi-hibernation."

In winter, when the animals are brought in at night—the stables and corrales being among the houses—the Anopheles are found in the stables and are hardly ever seen in the houses.

In spring and summer only the pigs are shut in at night, and then, in June and July, though Anopheles are still abundant in stables at the periphery of the village, they are very numerous in the houses.

The distribution of the insects in January and in June is graphically shown in two sketch plans.

A. A.

LEGENDRE (Jean.) **Anophélisme et cuniculiculture.**—*C.R. Acad. Sci.* 1921. Oct. 10. Vol. 173. No. 15. pp. 600–602.

In the author's experience, at Frejus, in the south of France, "*Anopheles maculipennis* normally feeds on the rabbit, exceptionally on man, the fowl, or the horse, less rarely on the pig and she-goat." Again "it loves to live all the year round in the atmosphere of the rabbit-hutch." Again "this insect deserts the communes from which rabbits are excluded, even if other animals exist there." In concluding that "rabbit-breeding is an effective protection against malaria transmitted by *A. maculipennis* in Europe," the author may or may not be right, but he is overlooking the fact that one of the categorical statements quoted above supplies the major premise of an entirely contradictory conclusion.

A. A.

BACHMANN (A.). **Notes sur les moeurs des anophèles et leur conditions de gîtes dans la ville de Famailla (Tucuman, République Argentine).** —*Bull. Soc. Path. Exot.* 1921. Oct. 12. Vol. 14. No. 8. pp. 506–511. With 3 plates.

The Government of Tucuman, in the Argentine Republic, have established in the country town of Famailla, a station to study for practical ends the life of the local Anopheles. The common local species are *A. pseudopunctipennis* and *A. albitarsis*. The former can be

found in houses throughout the town and environs at any hour of the day, both males and new-hatched and gravid females; as many as fifteen may be found in one room, and many more in dark and ill-ventilated dwellings. *A. albitarsis*, though a few males have been found at home in houses, lives abroad and only invades houses in numbers at nightfall.

Both these species breed in floating mats of the water-weed, known in the vernacular as *lama*, which collect in any clear, tranquil or gently moving water that is freely exposed to the sun and has a sandy bottom. Under those conditions the larvae flourish, even if the water be only a centimetre deep. But they are never found in shade, even when all the necessary aquatic conditions are existent.

A. A.

BACHMANN (Alois). **Programa de lucha para llevarse a cabo en Famaillá contra los anófeles y sus larvas.**—*An. del Depart. Nac. Hig.* Buenos Aires. 1921. May–June. Vol. 27. No. 3. pp. 117–137. With 8 figs.

This paper deals with the general principles of mosquito (Anopheles) control in their application to existing conditions at Famailla, the facts and figures of which are identical with those recorded above.

A. A.

GRASSI (B.). [**Osservazioni sulla Vita degli Anofeli.**] [Observations on the Life of Anophelines.]—*Rend. R. Accad. Naz. Lincei, Rome.* Classe Sci. fisiche, matemat. e naturali. 1920. Nov. 21–Dec. 5. Vol. 29. Nos. 10–11. pp. 307–313, 339–344.

From experimental observations made in the summer of 1920 the author concludes that the life of Anophelines at that season is very short. This may help to explain the absence of malaria with the presence of Anophelines as, though the insects may get infected, but few of them may live long enough to become actively infective.

Anophelines have some tendency to return to the place where they have fed, and this tendency should be employed against them in dwellings rather than in pigsties, etc.

A. A.

HERMS (William B.). **Distributional and Ecological Notes on Anopheline Mosquitoes in California.**—*Jl. Econom. Entom* 1921. Oct. Vol. 14. No. 5. pp. 410–414.

This paper is of interest mainly local. In the survey a distance of 18,000 miles was covered by automobile, the levels ranged from about 200 ft. below sea level to 10,000 ft. above it, and 690 collections of mosquitoes of all kinds were made. The obvious, but quite necessary, truths are enunciated that the occurrence of malaria depends on other factors besides the presence of potential Anopheles carriers—temperature, propinquity of population to anopheline foci and abundance of the specific Anopheles being three of them.

A. A.

FREEBORN (Stanley B.). **The Seasonal History of** *Anopheles occidentalis* **D. & K. in California.**—*Jl. Econom. Entom.* 1921. Oct. Vol. 14. No. 5. pp. 415–421. With 2 charts in text.

This paper is mainly of local interest, but it impresses the general truth that efficient malaria-mosquito control depends upon a full knowledge of the life-history of the particular species of Anopheles.

A. A.

BONNE-WEPSTER (J.) & BONNE (C.). **Surinaamsche Anophelessoorten.**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 6. pp. 673–679. With 1 plate.

The following species of Anopheles are found in Surinam: *Anopheles argyrotarsis, tarsimaculatus, peryassui, farjardi, apicimaculatus, mediopunctatus, nimbus, hylephilus* and *ciseni*. Keys for the identification of the adults and for such of the larvae as are known are here provided.

A. A.

BARBER (M. A.) & HAYNE (T. B.). **Arsenic as a Larvicide for Anopheline Larvae.**—*Public Health Rep.* 1921. Dec. 9. Vol. 36. No. 49. pp. 3027–3034.

In experiments in the laboratory and in the field the authors found Anopheles larvae to be very sensitive to Paris green. The poison is mixed with 100 times its volume of fine dust and the mixture is distributed by hand, aided by wind. The authors do not apprehend danger to anybody or anything but Anopheles larvae—a very comfortable assumption.

A. A.

MACFIE (J. W. S.). **The Effect of Saline Solutions and Sea Water on** *Stegomyia fasciata.*—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 377–380.

Larvae of *Stegomyia fasciata* have been found by the author [see this *Bulletin*, Vol. 7, p. 189] to be killed in a 2 per cent. salt solution and eggs in a 2·3 per cent. solution and females to be reluctant to lay their eggs in such solutions. In these more recent experiments the author finds that a 1–1·4 per cent. solution of salt, or sea water of equivalent strength, have a sufficiently destructive effect, and he thinks therefore that where it is available sea water might be used for municipal flushing purposes as a device against this dangerous insect.

A. A.

SÉGUY (E.). **L'***Aedes jugorum* **Vill. et les larves de moustiques à branchies très développées.** *Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 25–28. With 1 fig.

Several species of divers genera of Culicidae are here mentioned as possessing large tracheal gills. They are larvae that live either in small collections of water that are liable to evaporate quickly or in very foul water.

A. A.

i. MacGregor (Malcolm E.). **The Structural Differences in the Ova of *Anopheles maculipennis, A. bifurcatus* and *A. plumbeus*.**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 417–424. With 1 plate.

ii. Martini (E.). **Ueber die Eier unserer Anopheles.**—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Dec. 17. Vol. 87. No. 5. pp. 362–365. With 4 text figs.

iii. Iyengar (M. O. Tirunarayana). **A Note on Grappling Tail-Hooks in Anopheline Larvae.**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 630–633. With 2 plates.

iv. Blacklock (B.). **Breeding Places of Anopheline Mosquitoes in Freetown, Sierra Leone.**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 463–471. With 5 plates & 3 maps.

v. Martini (E.). **Ueber einen Aëdeszwitter.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 12. pp. 363–364.

vi. Ludlow (C. S.). **A New Philippine Mosquito** (*Diptera, Culicidae*).—*Milit. Surgeon.* 1921. Dec. Vol. 49. No. 6. pp. 690–691.

vii. Dunn (Lawrence H.). **The Lake Mosquito, *Mansonia titillans*, Walk., and its Host Plant, *Pistia stratiotes*, Linn., in the Canal Zone.**—*Proc. Med. Assoc. Isthm. Canal Zone.* 1918. Jan.–June. Vol. 11. Part 1. pp. 7–20.

viii. Pawan (J. L.). **On the Eggs and Oviposition of *Psorophora* (*Janthinosoma*) *posticata*, Wied. (Culicidae).**—*Bull. Entom. Res.* 1922. Feb. Vol. 12. Part 4. p. 481. With 1 plate.

(i) The eggs of these three species are well described and beautifully figured in dorsal, lateral and ventral aspect.

(ii) Comparisons, with good figures, of the eggs of *Anopheles maculipennis, bifurcatus* and *plumbeus*.

(iii) The author in a paper read before the Indian Science Congress, in January 1920 noticed the hooked extremities of the hairs of long terminal hair tufts of Anopheles larvae, and here enlarges on the subject.

(iv) This paper, which includes some very good photographs of Anopheles breeding-places, is of local interest.

(v) Describes an Aedes hermaphrodite.

(vi) *Stegomyia punctifemur* is described, as a new species, from the Philippines.

(vii) A most interesting and complete account of the insect and of the giant Lemnad, *Pistia stratiotes*, of wide circumtropical distribution, from which the larva and pupa of the insect obtain their air.

(viii) A carefully descriptive paper.

A. A.

Waterston (James). **A Contribution to the Knowledge of the Bionomics of Sand-Flies.**—*Ann. Trop. Med. & Parasit.* 1922. Mar. 31. Vol. 16. No. 1. pp. 69–92. With 1 plate & 7 figs.

The observations here recorded in great detail were made in camp in Macedonia, mainly in August and September, 1918. The species observed were *Phlebotomus papatasii, minutus* and *perniciosus*, of which the first was by far the most abundant (about 95 per cent.), and also the most active and voracious. Eggs and larvae are extremely difficult to find, and, in fact, were searched for without success. The adult flies were found sheltering during the day in and about the tents, in cracks in the earth, and between piled sand-bags.

Very full directions, illustrated by figures, are given for keeping and rearing Phlebotomus. Adults can be kept in earthenware pots standing in water and containing a little water in the bottom. To get females to lay in such pots, a tray of moist earth, slightly impregnated with faeces, should be stood in the water in the bottom of the pot. The eggs must not be allowed to get dry. The larvae also require a moist atmosphere,

and for food finely-ground earth that has been impregnated with blood is suitable. Success, in fact, appears to depend on keeping the insect in a moist atmosphere in all its stages, without allowing the environment to get mouldy.

A. A.

FRANÇA (Carlos) & PARROT (L.). **Essai de classification des phlébotomes.** — *Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 279–284. With 6 text figs.

In an earlier paper [see this *Bulletin*, Vol. 18, p. 196], the authors proposed to divide the genus *Phlebotomus* into two subgenera. They now propose five subgenera, which are here severally defined, the specific components of each being allocated in tabular form.

A. A.

i. PARROT (L.). **Notes sur les phlébotomes.** — *Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 269–278. With 10 text figs.

ii. VIALATTE (Ch.) & PARROT (L.). **Phlébotomes du Maroc.** — *Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. p. 566.

iii. NEWSTEAD (R.). **A New Species of** *Phlebotomus* **from Trinidad.** — *Ann. Trop. Med. & Parasit.* 1922. Mar. 31. Vol. 16. No. 1. pp. 47–50. With 1 fig.

iv. FRANÇA (Carlos). **Observations sur le genre Phlebotomus.** — *Bull. Soc. Portugaise des Sci. Naturelles.* 1921. Jan. 29. Vol. 9. 18 pp. With 3 text figs.

i. Detailed and tabulated comparisons of *Phlebotomus minutus* and its variety *africanus* with *P. bedfordi* and *P. fallax*. Also draws attention to the distribution of *P. sergenti*, and to abnormalities in the genitalia of the male in certain species of this genus.

ii. Note on the occurrence of four species of Phlebotomus, namely, *papatasii*, *perniciosus*, *sergenti* and *minutus* var. *africanus*, in Morocco.

iii. *Phlebotomus trinidadensis* n. sp. is described and figured. A relatively small species; superior claspers with five large spines—three terminal and two slightly beyond the middle, and opposite—and without tufts of non-deciduous hairs proximally. This is the first authentic record of Phlebotomus from Trinidad.

iv. The author describes according to his own formulary, and he also figures, *Phlebotomus vexator*, Coquillet, and *P. argentipes*, Annandale and Brunetti. He also distinguishes *P. brumpti* from *P. vexator* by his own formulae, and suggests that *P. zeylanicus* is a variety of *P. argentipes*.

A. A.

INGRAM (A.) & MACFIE (J. W. S.). **West African Ceratopogoninae.** — *Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 313–374. With 1 plate and 23 text figs.

This paper on West African Ceratopogoninae is a continuation of those already noticed in this *Bulletin*, [Vol. 18, p. 199; Vol. 19, p. 114]. It contains definitions of two new genera, descriptions of 20 new species and one new variety, descriptions of five larval and nine pupal forms recently discovered, and descriptions of the recently discovered male and of the recently discovered female of two other species.

A. A.

PATTON (W. S.). **Notes on the Species of the Genus *Musca*, Linnaeus—Part I.**—*Bull. Entom. Res.* 1922. Feb. Vol. 12. Part 4. pp. 411–426.

It has been the common and not unnatural belief that *Musca domestica* of Linneus is as ubiquitous as man himself; but the author finds, as regards the males of the Indian house-flies hitherto identified with *Musca domestica*, that they differ from the males of the typical British representatives of the species in having a much narrower front. On this character, therefore, he provisionally separates these questionable Indian representatives as "*Musca domestica*, L. (atypical)," and thus narrows the domain and relieves India of the burden of the supposed ubiquitous typical *Musca domestica*.

But, alas, there are in India, as elsewhere, other species of the genus Musca, which, both in their appearance and in their persistent and objectionable attention to man, resemble *Musca domestica* so closely that none but an expert can choose between them. And again, there are still other species which, though they have a most misleading likeness to *M. domestica* and its congeners aforesaid, have quite different habits of their own; they do not haunt kitchens and shops and annoy man himself, but they trouble his domestic animals, feeding on their secretions and exudations and sores.

Thus, from the practical as from the academic standpoint, it is necessary to recognize apart all these many kinds of flies which, to the careless observer, might from their general similarity pass under the name of *Musca domestica*.

In the present paper this practical need is being satisfied; it is a first instalment of a revision of the genus *Musca* and deals with the Oriental species, 15 in number, and the Australian species which at present appear to be six.

A. A.

ROUBAUD (E.). **Fécondité et longévité de la mouche domestique.**—*C.R. Acad. Sci.* 1921. Nov. 28. Vol. 173. No. 22. pp. 1126–1128.

At a temperature of 20° C., Roubaud has kept flies (*M. domestica*) alive in a small muslin cage for 76 days. With proper nourishment, *which must include nitrogenous matter*, the fly under the above conditions starts its first batch of eggs on the 6th–8th day after its eclosion, and continues with further batches every four days on an average; and there may be 120 eggs in a batch. The largest batches are produced on a diet of condensed milk. Too close confinement is very unfavourable to the house-fly.

Roubaud concludes from his experiments that in warm weather a normal house-fly will give issue to at least 600 eggs in a course of about 40–60 days.

A. A.

BISHOPP (F. C.) & LAAKE (E. W.). **Dispersion of Flies by Flight.**—*Jl. Agric. Res.* Washington. 1921. Aug. 15. Vol. 21. No. 10. pp. 729–766. With 3 figs.

The authors of this long paper on the powers of flight of flies describe in full detail how their experiments were devised and conducted and give a very particular account of their observations. Altogether the

number of flies manipulated was, by estimate, about 234,000, belonging to nine species, but mainly *Musca domestica, Chrysomyia macellaria,* and *Phormia regina.*

They found that liberated flies scatter in all directions, that they travel distances much greater than is commonly supposed, and that though their main objects are, of course, either to reach food or a fit place for lodging their eggs, they are not always satisfied with the first favourable place reached. The greatest distance travelled by *Musca domestica* was 13·14 miles; by *Chrysomyia macellaria,* 15·1 miles; and by *Phormia regina,* 10·9 miles. *Musca domestica* and *Chrysomyia macellaria* seem to like to go with the wind, but can go at right angles to it, or against it; moderate winds, however, do not seem to exercise much influence any way.

The distances travelled by other species used in the experiments were: *Lucilia caesar,* 3·5 miles; *L. sericata,* 1·2 miles; *Synthesiomyia brasiliana,* 0·5 mile; Sarcophaga spp., 3 miles; *Ophyra leucostoma,* 7 miles; and *O. aenescens,* 4·1 miles; but the authors are not satisfied that the number of individuals used was large enough for forming valid conclusions as to the powers of dispersion of any of these species.

A. A.

JOHNSTON (T. Harvey). **Notes on Certain Queensland "Bush Flies."** —*Australasian Med. Congress. Transactions of the Eleventh Session held in Brisbane, Queensland, 21st–28th Aug., 1920.* pp. 265–272.

A full descriptive account of *Eumusca vetustissima* Walker, and of *Viviparomusca fergusoni,* and *Musca* (*Promusca*) *terraereginae* and *hilli,* all of JOHNSTON and BANCROFT, with remarks on the trouble they cause to stock and on their possible relation to public health questions. Five species of parasitic Hymenoptera, one of which is known to destroy pupae of these flies, are also mentioned.

A. A

PATTON (W. S.). **Notes on the Myiasis-producing Diptera of Man and Animals.**—*Bull. Entom. Res.* 1921. Nov. Vol. 12. Pt. 3. pp. 239–261. With 2 plates & 2 text figs.

This is a useful paper containing much systematized information about dipterous maggots that cause different kinds of myiasis in man and other mammals, and two good plates illustrating the specific characters of the posterior stigmata and their air-slits by which these different kinds of maggots can be identified.

The maggots are catalogued in three series, namely:—(1) "Specific Myiasis-producing Diptera," including the *Oestridae* (of which a considerable list of species, with their respective hosts, is given); *Chrysomyia bezziana,* two species of *Cordylobia,* and *Wohlfahrtia magnifica*; (2) "Semispecific Myiasis-producing Diptera," including species of Calliphora, Lucilia, Chrysomyia, Cochliomyia, Pollenia, Phormia, Sarcophaga, Cynomyia and Apiochaeta; and (3) "Accidental Myiasis-producing Flies," including Eristalis, and some Anthomyids and acalyptrate Muscidea.

A. A.

PATTON (W. S.). **Some Notes on Indian Calliphorinae. Part II.** *Lucilia argyricephala*, **Macq.** (*serenissima*, **Fabr.**), **the Common Indian Bazaar Green Bottle, whose Larvae occasionally cause Cutaneous Myiasis in Animals, and** *Lucilia craggii*, **sp. nov., one of the Common Blow Flies of Indian Hill Stations. Part III.** *Chrysomyia megacephala*, **Fabr.** (**Dux Esch**), **the Common Indian Blue Bottle, whose Larvae occasionally cause Cutaneous Myiasis in Animals, and** *Chrysomyia nigriceps*, **sp. nov., the Common Blue Bottle of the Nilgiris. Part IV.** *Chrysomyia albiceps*, **Wied.** (*rufifacies*, **Froggatt**), **one of the Australian Sheep Maggot Flies, and** *Chrysomyia villeneuvii*, **sp. nov. Part V.** *Lucilia pulchra*, **Wied.** (*ruficornis*, **Macq.**), **a Larviparous Calliphorine, and** *Lucilia bullardii*, **sp. nov., a Common South Indian Blow Fly.**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 648–554. With 1 coloured plate; pp. 555–560. With 1 coloured plate; pp. 561–569. With 2 text figs. & 1 coloured plate; pp. 570–574. With 1 coloured plate.

The species particularized in the title are carefully described in all their stages and in their habits, and are also beautifully figured by Mrs. Patton. The larvae of *Chrysomyia albiceps* and *villeneuvii* are peculiar both in form and in habits; their abdominal segments are prominently and regularly festooned, every lappet of the festoons being tipped with spines; and they themselves are predacious on larvae of other Calliphorines, which they hold firmly by fixing them with the spines of the terminal segment and then coiling the body round them.

LARROUSSE (F.). **La myiase oculaire à** *Oestrus ovis* **L. dans la région parisienne.**—*Bull. Soc. Path. Exot.* Nov 9. Vol. 14. No. 9. pp. 595–601. With 5 text figs.

Apropos two cases of ophthalmyiasis due to a first-stage larva of *Oestrus ovis*, the author draws attention to the difference between this and the same stage of the *Rhinoestrus purpureus* larva, and reproduces PORCHINSKY's figures of both species. In the young larva of *Oestrus ovis* the mouth hooks have a fairly open curve, and the terminal segment of the body is crowned with 20–22 spines, whereas in that of *Rhinoestrus purpureus* the mouth hooks are sharply recurved and talon-like and the body terminates in 8 or 10 spines.

Ophthalmyiasis caused by *Oestrus ovis* is, as the brothers SERGENT have stated, common enough in North Africa, but *Rhinoestrus purpureus* is a more generally common cause; young larvae of Calliphorinae and Sarcophaginae are sometimes responsible, and Hypoderma has been observed, but always as an intra-ocular parasite.

The author gives reference to 16 papers on this subject.

A. A.

GABRIELIDES (A.) & GUIART (J.). **La myose oculaire à** *Oestrus ovis* **à Constantinople.**—*Bull. Acad. Méd.* 1922. Feb. 28. 3rd Ser. Vol. 87. No. 9. pp. 253–255.

Case of ocular myiasis in a shepherd. Under novocaine 14 first-instar larvae of *Oestrus ovis* were extracted.

A. A.

GEDOELST (L.). **Le trimorphisme larvaire des oestridés.**—*C.R. Soc. Biol.* 1922. Mar. 4. Vol. 86. No. 9. pp. 501–504.

BOAS has described four larval stages for *Gastrophilus pecorum*, and LAAKE five for *Hypoderma bovis* and *lineatum*: the author's observations lead him to conclude that the larvae of Gastrophilus and Hypoderma have, like all other Cyclorraphous larvae, only three stages.

A. A.

BENGTSON (Ida A.). **Preliminary Note on a Toxin-Producing Anaerobe isolated from the Larvae of** *Lucilia caesar.*—*Public Health Rep* 1922. Jan. 27. Vol. 37. No. 4. pp. 164–170.

The organism here described as having been isolated from the larvae of *Lucilia caesar* is apparently non-proteolytic in meat-mash media but produces gas abundantly. It is a non-motile rod, 3–6$\mu$, by 0·5–0·8$\mu$, with rounded ends, and occurs singly, but sometimes in pairs or short chains; it is gram-positive in young cultures but rarely so in older cultures; and it forms terminal spores. Toxin was produced in meat cultures of two or three days, or after longer terms of incubation. The filtrate of the organism is toxic both by inoculation and by mouth to ordinary laboratory animals, monkeys, pigeons and chickens, as is the toxin of *Clostridium botulinum*, but botulinus antitoxin confers no protection. The symptoms resemble botulism—inability to stand, prostration and salivation.

Cultural characters in divers media besides meat-mash are recorded.

A. A.

MURRAY (William A.). **Note on Relation between Tsetse Fly** (*Glossina morsitans*) **and Game in the Proclaimed Area, Nyasaland.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Oct. 20. Vol. 15. No. 4. pp. 118–121. With 1 map.

The author, who from 1905 was on the look out for cases of sleeping sickness and was personally cognizant of the earliest cases that were actually diagnosed in Nyasaland (in 1908) considers that the disease was introduced about that time from Lake Tanganyika or from N.E. Rhodesia, or from both places. He reviews the progress of the trypanosome infection from West Africa and the Lower Congo to the Congo basin generally (1892) and Uganda (1896), thence, via Lake Tanganyika, towards the Katanga district, and thence to N.E. Rhodesia (1908), on the assumption that in its course the alteration in the specific insect carrier from *palpalis* to *morsitans*, combined with other circumstances not at present understood, effected changes in the nature of the trypanosome which culminated in the establishment of the distinct *rhodesiense* "strain." The author has an impression that both the virulence and the spread of the infection have diminished in Nyasaland.

A. A.

FISKE (W. F.). **Report of Entomologist.**—*Uganda Protectorate Ann. Med. & San. Rep. for the Year ended 31st December, 1920.*—pp. 49–64.

This report deals with Victoria Nyanza Infected Area, and consists mainly of direct and indirect argument for the amendment of the Sleeping Sickness Regulations, so as to permit the repopulation

of the said area and the rehabilitation of the fisheries which in days before the great epidemic were its most important industry. Much of the report is occupied with observations on the fisheries, and on other, subsidiary, economic enterprises.

The author's line of argument is that the tsetse fly has no predilection for human beings, but is a creature of the jungle, and, like other wild creatures, tends to disappear before the advancing turmoil of industrial man ; and therefore, that the surest way of extirpating the fly in a particular area is to promote and encourage the industries by which the local population thrives and multiplies and finally asserts its mastery of the jungle. The entomologist plays his part by showing how appropriate clearing and cultivation and the maintenance of open pastures, etc., may hasten the discomfiture of the fly by depriving it of shelter and breeding grounds.

The argument is sound enough ; and in insisting on the view that the "control" of the tsetse fly must be one of the incidents of a general economic progress and is therefore on a different plane of experience from the control of insect pests in countries that have left the pioneer stages of civilization far behind, the author has done boldly, since, like the little eyases in Hamlet, he may thereby appear to exclaim against his own succession. The argument, coming from an entomologist, may disappoint a perplexed executive, but it does not shock those who have considered how in England—among other unheeded results of the change in the general standard of industrial and material comfort during the last few generations—the anopheles mosquito has quietly been relegated to a harmless place in its own obscure sphere.

It may be repeated that the author's theory of tsetse fly extermination is sound, though not particularly comforting. But when the author goes on to contend that the persistence of foci of sleeping sickness—or, as he puts it, "the recurrence of a few localized centres of epidemic"—is necessary in order to excite the population against the fly, he carries the argument into academic regions where it is more interesting to the metaphysician than to the sanitarian who prefers goads tempered with humanity.

Among items of interest it is noted that in Sese the situtunga antelope have so increased that in certain localities formerly densely infested by fly they have destroyed the low bush to such an extent as to have caused complete disappearance of fly ; also that goats have proved a wonderfully efficient aid in maintaining new clearings, but that the native breed is not hardy.

A. A.

SCHWETZ (J.). **La présence de pupes de** *Glossina palpalis* **à 1,500 m. de l'eau.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol 15. No. 1. pp. 23–25.

There are in the Kwango district of Belgian Congo, thickets having an area of 5,000-10,000 square metres and lying some distance from water, which give cover to *Glossina palpalis*. These thickets, which usually mark the sites of old villages, generally harbour pigs. In one of the smallest of these thickets, 1,500 metres away from water and containing only three large trees, a living pupa and also four empty pupal cases of *G. palpalis* were found, in loose dry soil only slightly shaded [*cf.* FISKE ; this *Bulletin*, Vol. 17, p. 119].

A. A.

NEWSTEAD (R.) & EVANS (Alwen M.). **A New Tsetse-Fly from the South Cameroons.**—*Ann. Trop. Med. & Parasit.* 1922. Mar. 31. Vol. 16. No. 1. pp. 51–54. With 2 text figs.

This new species from the South Cameroons, *Glossina haningtoni*, is very close to *G. fusca*, but differs in the much shorter "palpi (proboscis)," the slightly more robust appearance and in some details of the genitalia—the harpes of the males having each three teeth, and the "signum" of the female being slightly longer than broad and having the paired crescentic folds almost continuous behind.

A. A.

CRAGG (F. W.). **The Geographical Distribution of the Indian Rat Fleas as a Factor in the Epidemiology of Plague: Preliminary Observations.**—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 374–398. With 1 map, 3 charts in text and 1 plate.

Although rats occur everywhere in India and all of them may be assumed to have fleas, and although we do not know of any climatic or topographical or artificial conditions unfavourable to the general spread of rat and rat-flea infection all over the country, yet it is a fact that there are certain parts of India to which plague—dealing with the history of the disease since the Bombay outbreak in 1896—has never spread, and certain parts which it has reached occasionally without any consequent epidemic conflagration. The areas which have been notably spared are situated in the southern part of the Madras Presidency and the east coast, in the plateau of Central India, in Eastern Bengal and Assam, and in the western part of Burma. In Madras itself, though the disease has been repeatedly introduced, it has never become epidemic.

As long as it was supposed that all the rat-fleas of the greatly preponderant rat-flea genus *Xenopsylla* were of one species, *X. cheopis*, these remarkable gaps in the dispensation of plague were attributed to some undiscovered factor in which the rat-flea was not necessarily implicated; but now that it is known that the Xenopsyllae of Indian rats include three distinct species—*X. cheopis*, *X. astia* and *X. brasiliensis*—it is rational to suppose, and Major Cragg does suppose, that not all of them—possibly only one of them—may be potent to spread the plague bacillus.

It might be thought that the surest way of settling the matter would be to find out by experiment whether there is any difference between these three species in their behaviour so far as the intake and output of the plague bacillus is concerned. Major Cragg may be trusted to attend to this part of the proposition in due course; but in the meantime he has carried out some stages of the necessary preliminary investigation as to whether in the distribution of each separate species in India there is anything suggestive of such a difference of behaviour.

He here gives us the results of a laborious examination of 107 collections—aggregating 17,339 individual specimens—of rat-fleas representative of areas variously shown on the plague map of 1917 as heavily infected with plague, lightly infected, and free from plague. The whole mass of material has been specifically identified, with the object of discovering what in these diverse areas is the actual percentage of each species of rat-flea present.

Of the 17,339 fleas identified, 53·9 per cent. are *X. cheopis*, 36 per cent. *X. astia*, 7·7 per cent. *X. brasiliensis*, 2·1 per cent. *Ceratophyllus* sp., and 0·3 per cent. *Leptopsylla musculi*; and though the local incidence of each species is shown in the tabulated summaries, attention is concentrated on *X. cheopis* and *X. astia* as being not only the most numerous but also the most generally distributed over the whole country.

The tables themselves must be studied. The author is satisfied that they "point very strongly to a close relation between the predominance of *X. cheopis* and high plague mortality." He expresses the opinion, indeed, that *X. cheopis* is "truly the plague flea," while *X. astia* is the predominant species in areas which have been free from plague or have suffered but lightly. Some such suggestive records can certainly be picked out. Taking, for instance, the "plague-free" places, Akyab, Guntur, Cocanada, and the "plague-free" South Arcot area: of 1,421 Akyab fleas in the collections, 97·8 per cent. were *astia*, and only 2·2 per cent. *cheopis*; of 149 Guntur fleas in the collections, 90·6 per cent. were *astia*, and only 9·4 per cent. *cheopis*; of 264 Cocanada fleas in the collections, 77·3 per cent. were *astia* and 22·7 per cent. *cheopis*; of 224 South Arcot fleas in the collections, all were *astia*. Again, all the 184 fleas sent to the author from Madras, where plague has never been epidemic, were *astia*. On the other hand, these records show a number of places that have suffered something much more than lightly from plague, where *astia* is very well represented. For instance, of 782 fleas from Bombay, 49·9 per cent. were *astia* and 49·6 per cent. *cheopis*; of 328 from Rohtak, where the plague mortality for twenty years, 1896–1917, is shown as 100–150 per 1,000, 20·5 per cent. were *astia* and 79·5 per cent. *cheopis*; of 626 from Lahore, where the plague mortality for the twenty years is shown as 150–200 per 1,000, 17·6 per cent. were *astia* and 79·2 per cent. *cheopis*; of 173 from Chiniot (Jhang), where the plague mortality for the twenty years is shown as 20–50 per 1,000, 56·1 per cent. were *astia* and 36·8 per cent. *cheopis*.

Then, furthermore, although the records certainly show that in seven places, where the plague mortality for the twenty years, 1896–1917, ranged from 150–300 per 1,000, the predominant rat-flea—up to 99 per cent. of the collection in one place—was *cheopis* they also show that in Bombay, where the plague mortality for the twenty years ranged from 150–200 per 1,000, out of the collections of 782 rat-fleas, 49·9 per cent. were *astia* against 49·6 per cent. *cheopis*; that of 328 from Rohtak, where the plague mortality for the twenty years was 100–150 per 1,000, 20·5 per cent. were *astia* against 79·5 per cent. *cheopis*; that of 626 from Lahore (plague mortality 150–200 per 1,000) 17·6 per cent. were *astia* against 79·2 per cent. *cheopis*; that of 1,567 from Gurgaon (plague mortality 50–100 per 1,000) 61·6 per cent. were *astia* and only 37·9 per cent. *cheopis*; that of 181 from Rangoon (plague mortality also 50–100 per 1,000) half were *astia* and half *cheopis*, as in Bombay; that of 173 from Chiniot (plague mortality 20–50 per 1,000) 56·1 per cent. were *astia*, and only 36·8 per cent. *cheopis*; and that of 250 from Multan (plague mortality 5–10 per 1,000) 99·6 per cent. were *astia* and only 0·4 per cent. *cheopis*. In the collections also from Lyallpur, Bangalore and Bellary—all places that had a considerable plague mortality—the percentages of *astia* run high.

A. A.

CHRISTOPHERS (S. R.) & CRAGG (F. W.). **On the So-Called "Penis" of the Bedbug** (*Cimex lectularius*, **L.**) **and on the Homologies Generally of the Male and Female Genitalia of this Insect.**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 445–463. With 3 plates.

This is a careful and very particular description of the genital structures of the bedbug, both male and female, and of their development. It is shown that the claw-like structure commonly styled penis is not a penis at all, but a penis-sheath or guide.

A. A.

CUNLIFFE (N.). **Some Observations on the Biology and Structure of** *Ornithodorus moubata*, **Murray. Together with a Note on the External Characters which serve to differentiate the Sexes** (by G. H. F. NUTTALL).—*Parasitology.* 1921. Nov. Vol. 13. No. 4. pp. 327–347. With 5 text figs. and 1 plate.

In these observations it is recorded that pairing may take place between *Ornithodorus moubata* and *savignyi*, and that ovipary may follow, but that the eggs were not fertile; that no satisfactory evidence of parthenogenesis was observed in *O. moubata*; that with ticks of this species kept under laboratory conditions at 22°, 30° and 37° C., the change from 22° to 30° C. resulted in doubling the rate of ovipary, diminishing the fertility of the eggs by 30 per cent., and shortening the span of life of the female by 40 per cent., while the change to 37° C. almost entirely inhibited reproduction and shortened the span of life by 80 per cent.; and that adults of this species do not moult.

As regards the development of *O. moubata*, only 36·3 per cent. of 1,233 eggs were reared to the adult stage, 22° C. being found a more favourable temperature than 30° C. The number of moults before maturity was from four to six for males, and from five to seven (exceptionally eight) for females; the time occupied in development from egg to adult ranged from 64 to 104 days at 22° C., and from 36 to 72 days at 30° C., the amount of nutriment taken during the process not making much difference, within reason; but moisture was found to be unfavourable to vitality, and excess of moisture fatal. The number of teeth of the hypostome was observed to increase at each moult; the new-hatched larva has only four teeth altogether, namely, two files of two each; in the sixth and seventh stage nymphs there are three, increasing posteriorly to five, files of many teeth, on each side of the hypostome. The frills on the extensor surface of the tarsi and protarsi are absent in the larva, and do not become as prominent as those of the adult until the sixth and seventh nymphal stages; their successive changes in the fourth pair of legs are graphically illustrated. The form of the spiracle also changes in the course of development.

A. A.

DUNN (Lawrence H.). **Studies on the Iguana Tick,** *Amblyomma dissimile*, **in Panama.**—*Proc. Med. Assoc. Isthm. Canal Zone.* 1918. July–Dec. Vol. 11. Pt. 2. pp. 7–18.

Adult females of *Amblyomma dissimile* were observed to remain attached to a snake host for from 15–36 days. No precise observations were made as to males, but two have been attached to a snake for seven months.

A replete detached female gave issue to 9,254 eggs in the course of 35 days. The average incubation period for eggs was 40 days.

Larvae provided with a host remained attached for varying terms, usually 13 days; but some remained attached to the end of their nymphal stage.

Of the replete larvae that detached themselves, the change to the nymphal stage commonly occupied 14 days.

Nymphs provided with a host remained attached for 11–22 days before dropping off. Thereafter the change from nymph to adult occupied 8–16 days.

As regards longevity apart from a host: under conditions of reasonable moisture, larvae could live for 228 days, nymphs for 162 days, adult females 147 days.

As regards other vicissitudes: an unfed female was rescued alive on the seventh day of complete submersion under water.

A. A.

DUNN (Lawrence H.). **The Tick as a Possible Agent in the Collocation of the Eggs of** *Dermatobia hominis.—Proc. Med. Assoc. Isthm. Canal Zone.* 1918. Jan.–June. Vol. 11. Pt. 1. pp. 21–25.

The author's colleague of the Pathology Department, when in the field, was molested by ticks on three separate occasions. Five ticks in all were removed from his body, four of them from parts well protected by clothing. In every case the individual bites were well treated, after complete removal of the tick, with tincture of iodine. In every case the wound, instead of healing, remained indolent and subsequently became inflamed. In every case the inflamed wound was found to harbour a small larva of *Dermatobia hominis.* To make sure of the identification, one of the larvae after removal was entertained with a guinea-pig, in whose skin it grew into a specifically certain *D. hominis* larva 20 mm. long.

The ticks were not kept, but on circumstantial evidence were believed to be *Amblyomma cajense.*

We may agree with the author's reasonable inference that ticks carried the eggs of the fly in these cases, and also prepared the road for the larva.

A. A.

DODD (Sydney). **Tick Paralysis.**—*Jl. Comp. Path. & Therap.* 1921. Dec. Vol. 34. No. 4. pp. 309–323.

This excellent paper contains, besides details of experimental observations, a good historical review of Australian experience, beginning in 1884 with BANCROFT, and a bibliography of the subject.

Tick paralysis occurs mostly in the young; the author has heard of very few cases in adult animals, and does not know of an authenticated case in adult human beings. It is believed, though a single chance observation made by the author does not confirm the belief, that the indigenous animals of Australia are immune. In susceptible individuals the bite of a single tick is enough to cause grave symptoms and even death.

Symptoms are manifested some days after the tick has attached itself; the earliest are loss of appetite and vomiting; then gradual motor paralysis, first of the hind-quarters and afterwards extending generally; finally coma and death from failure of respiration. The pulse does not seem to be much affected. Recovery may take place,

particularly if the tick is removed in the earlier stages, but not after paralysis has become general. If the tick is properly removed quite soon after its attachment symptoms do not occur.

In the author's experiment with a guinea-pig of 820 gm. symptoms began on the fifth day after a single tick had attached itself. The hind-quarters gradually became paralysed and then the fore limbs; at times the breathing was stertorous. Next morning (sixth) the animal was found dead, the tick being still adherent and almost replete. At the post-mortem investigation there was great extravasation for about an inch round the site of the attachment, the bladder was full of milky urine, the apices of the lungs were intensely congested and the coronary vessels were engorged. The blood appeared normal and was not infective to another guinea-pig.

In an experiment with an almost full grown Pomeranian dog, symptoms began—on the seventh day after a single tick had attached itself—with vomiting, stretching and yawning, slight loss of co-ordination in the hind legs and loss of spirit. On the eighth day the hind-quarters were completely paralysed, and the paralysis extended forwards, respiration became affected, food and water were refused and there were continual attempts at vomiting. On the ninth morning the animal died in a state of coma; the tick was still attached and not full to repletion. The blood and cerebro-spinal fluid were not infective to a guinea-pig.

The ticks in both experiments were *Ixodes holocylus*.

In another experiment with an adult fox terrier nothing happened, although the tick remained attached for six days and fed to repletion. The previous history of the dog is not known.

A. A.

LAWRENCE (Herman). **Further Observations upon the Pathogenicity of** *Demodex* **(Owen) in the Human Being and of Other Parasites producing Skin Diseases.**—*Med. Jl. Australia.* 1921. Nov. 12. 8th Year. Vol 2. No. 20. pp. 419–425. With 13 text figs.

An interesting excursion among the mites, Demodex, Dermanyssus, and some other small acarines that by chance may cause trouble to man. We are also introduced to a Carabid beetle suspected of biting a man, and to an illustration of the stunting effects of irradiation upon silkworms—effects which suggest to the author the practical application of radium in the treatment of skin disease due to the presence of acarines.

A. A.

NAGAYO (Mataro), MIYAGAWA (Yoneji), MITAMURA (Tokushiro), TAMIYA (Takeo) & TENJIN (Satoru). **Five Species of Tsutsugamushi (the Carrier of Japanese River Fever) and their Relation to the Tsutsugamushi Disease.**—*Amer. Jl. of Hyg.* 1921. Sept.–Nov. Vol. 1. No. 5–6. pp. 569–591. With 1 chart & 8 plates.

There appear to be at least five species of Trombidiid mites which have been defined as tsutsugamushi, but only one of them, *Trombicula akamushi*, is of significance in the transmission of Japanese River Fever (tsutsugamushi disease) to man. The disease occurs only at the time of year when the larvae of this species appear. From the

fact that the disease can be communicated to monkeys by inoculating an emulsion of the crushed bodies of the adult mites, it is assumed that the larvae inherit the specific infection from their parent.

A. A.

REICHENOW (Eduard). **Intrazelluläre Symbionten bei blutsaugenden Milben und Egeln.** [The Intracellular Symbiotes of Blood-sucking Mites and Leeches.]—*Arch. f. Protistenk.* 1922. Vol. 45. No. 1. pp. 95–116. With 8 figs. in text.

ROUBAUD [this *Bulletin*, Vol. 15, p. 160] has described at considerable length the intracellular fungi of Glossina, which are believed to be in some way auxiliary to digestion. The author of the present paper describes and figures similar intracellular fungi of mites and leeches, and refers to those of the pupiparous Diptera and other blood-sucking insects. He thinks that these fungi may have some pathological significance for the vertebrates upon which the insects that harbour them feed.

A. A.

i. KIEFFER (J. J.). **Nouvelles observations sur les diptères piqueurs de la tribu des Ceratopogoninae.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1: No. 3. pp. 262–268. With 2 text figs.
ii. HOFFMANN (W. H.). **Sobre la mosca,** *Chrysops costata* **Fabr., que chupa la sangre del hombre, observada en Cuba.**—*San. y. Benefic. Bol. Ofic.* 1921. Sept. Vol. 26. No. 3. pp. 121–122. With 1 plate.
iii. YAKIMOFF (W. L.). **Contribution à l'étude des Ixodidés de Russie.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 41–46.

i. Descriptions of *Culicoides langeroni* and *Holoconops mediterraneus*, n. spp., and notes on *Mycterotypus bezzii* Noc and *Acanthoconops*.
ii. Figure and some remarks on the habits of this species.
iii. A list of the Ixodidae of European and Asiatic Russia, with a list of their hosts and a list of the blood parasites that they disseminate.

A. A.

HILDEBRAND (Samuel F.). **Top Minnows in Relation to Malaria Control, with Notes on their Habits and Distribution.**—*Public Health Bull.* 1921. May. No. 114. pp. 7–33. With 32 figs.

This excellent pamphlet, if it does not contain anything very new, gives an admirable account of certain Cyprinodont fishes of the southern states of America, and of the usefulness of some of them in keeping Anopheles mosquitoes in effective check; it is well printed and is plentifully illustrated with figures of the fishes and appropriate views of ponds and ditches.

Of all the species observed, *Gambusia affinis* is said to be the most useful. It is adaptable and it frequents the places favoured by mosquitoes. It becomes mature in four months and produces new broods at intervals of three to six weeks during the warm weather.

Another serious enemy of the mosquito is *Heterandria formosa*, which also produces new broods at short intervals.

These "top minnows" have their most effective application in permanent ponds and lakes that it is impossible or inconvenient to drain.

A. A.

VAN SOMEREN (W. H.). **Report on a Short Small-Mammal Survey and the Distribution of *Rattus rattus kijabius* in the North Kavirondo District.** [MS. Report, dated Dec. 2, 1921, received from the Colonial Office.]

Report of a six months' survey of villages in the North Kavirondo District of the Nyanza Province, Kenya Colony, with the main object of determining the exact distribution of *Rattus rattus kijabius*, a plague carrier, now common in native dwellings, but said to be a recent immigrant gradually supplanting a multimammate rat known in the vernacular as *muunchu*. The report shows that both *kijabius* and *muunchu* are found as true house rats in the area surveyed, and that though usually they do not occur together in the same house, there are places where they do. A good deal of native evidence was collected in some villages to the effect that *kijabius* was a recent arrival; and although it is quite impossible to follow the details of the report without a large-scale map, there does seem to be some evidence that the spread of *kijabius* is a true invasion.

It is noted that no other rodents were found in houses occupied by a small species of dormouse, and that the natives have a tradition that this dormouse scares rats away.

A. A.

HAZRA (M. M.). **Practical Notes on Thirty-five Snake Bite Cases and their Treatment with Different Drugs.**—*Indian Med. Gaz.* 1921. Nov. Vol. 56. No. 11. pp. 404–408.

Although these cases, 13 of which are described, are interesting, they are not so very instructive, since the essential terms of the argument are not, in the language of the great philosopher of Malmesbury, sufficiently "purged and snuffed from ambiguity." For instance, when the author states that in cases of viper bite he did not get any satisfactory results from antivenene, and, therefore, preferred to give intravenous injections of iodine, he does not define the antivenene used.

The cases seem to have been treated on approved principles—ligature, local injection of permanganate or of gold chloride, and intravenous injection of antivenene—but, though they include bites of pit-viper, cobra, krait, varanus lizard and other unidentified species, in no instance is there any specific statement of the nature of the antivenene employed in the individual case.

For intravenous injection of iodine 10 minims of a 3 per cent. solution of tincture, in 1 cc. of distilled water, was used.

A. A.

MICHAEL (D. F.). **An Unusual Case of Snake-Bite.**—*Indian Med. Gaz.* 1922. Jan. Vol. 57. No. 1. pp. 17–18.

The patient in this case was seen seven and a half hours after he had been bitten on the forefinger by a full-sized cobra. He was unable to stand or to sit up, there was marked ptosis, the speech was indistinct and very nasal; deglutition was difficult and fluids regurgitated through the nose, and there was restlessness and dyspnoea. The whole of the hand was greatly swollen and without sensation.

A ligature was applied, solid $KMnO_4$ was rubbed into the bite, and the whole hand was infiltrated with about 5 cc. of a 5 per cent. solution of gold chloride; also a hypodermic injection of strychnine and digitalin was given.

The patient was not brought to hospital, and was not seen till six days afterwards, when he walked in, "displaying a very gangrenous-looking hand and arm, but otherwise quite well."

A. A.

DO AMARAL (Afranio). **Um novo sôro anti-peçonhento. (Sôro anti-crotalico norte-americano.) Nota prévia.** [A New Anti-Venomous Serum.]—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1921. July & Aug. Vol. 4. 2nd Series. Nos. 5 & 6. pp. 134–136.

Before using a supply of venom of *Crotalus confluentus*, Say (= *C. atrox*, Cope) for immunization purposes, the author verified its properties. He finds that it is much more haemolytic than that of *C. terrificus* and comparable in this property to *Lachesis jararacussu*; that it is anti-coagulant; and is proteolytic in about the same degree as that of *Lachesis atrox*.

A. A.

HOUSSAY (B. A.), OTERO (M. J.), NEGRETE (J.) & MAZZOCCO (P.). **Action des venins coagulants de serpents sur le sang.**—*C.R. Soc. Biol.* 1922. Feb. 18. Vol. 86. No. 7. pp. 411–412.

Except for a few refined biochemical particulars of interest to the specialist, this short paper contains nothing not already known regarding the action of coagulant venoms upon the blood.

A. A.

CAVASSA (Nicolas E.). **A propósito de algunos casos de aracnoidismo observados en Pacasmayo.** *Crónica Méd.* Lima. 1921. Sept. Vol. 38. No. 699. pp. 298–301.

Brief notes of three cases of severe local and constitutional symptoms caused by the venom of two spiders here referred to by the vernacular names of "luna" and "yacomé."

A. A.

BAERG (W. J.). **The Effect of the Poison of Tarantulas.**—*Jl. Parasit.* 1921. Dec. Vol. 8. No. 2. pp. 86–89.

The "tarantula" of these unsatisfactory experiments was *Eurypalma steindachneri*, one of the large Avicularíine spiders. The effects of the poison are not very clearly stated; they seem to have been not serious.

A. A.

SUTHERLAND (J. W.). **Treatment of "Red-Back" Spider Bite.** [Correspondence.]—*Med. Jl. Australia.* 1921. Dec. 31. 8th Year. Vol. 2. No. 27. p. 632.

SUTHERLAND (J. W.); VANCE (E. B. M.); WALLMAN (D. Robson). **"Red-Back" Spider Bite.** [Correspondence.]—*Ibid.* 1922. Jan. 21. 9th Year. Vol. 1. No. 3. p. 84; Jan. 28. No. 4. p. 113; Feb. 4. No. 5. p. 139.

These are references to the effects of the bite of the notoriously venomous spider *Lathrodectes hasselti*, found in the Australian and Oriental Regions; it seems to be common in summer in some parts of Australia.

The spider commonly hides under the seat of closets, so that the genitals are most likely to get bitten. The symptoms are excruciating pain, usually extending to the legs and back, and very profuse sweating, and they may last for three or four days. The pain passes into numbness, tingling, paresis, or even temporary paralysis. There may also be cardiac distress and syncope.

The best local treatment seems to be that for snake-bite, *e.g.*, application of permanganate of potash.

[Writers usually call the spider, Latrodectus or Lathrodectus; the correct designation is Lathrodectes (λαθροδήκτης = biting secretly).]

A. A

JOHNS HOPKINS UNIVERSITY. **Activities of the Department of Medical Zoology, School of Hygiene and Public Health, Johns Hopkins University.** [Mimeographed MS.]

The teaching embraces Protozoology, Helminthology, and Medical Entomology in their taxonomic, morphological, physiological, bionomic, pathological, and preventive aspects. Besides the ordinary courses there are special three weeks' courses in Medical Zoology for Health Officers, and short "intensive" courses for Public Health Officers. A club meets once a week to read and discuss a paper. Once a month during the school year the members of the department and others interested meet in the evening to discuss some phase of medical zoology. Besides the school library other libraries of the University and local societies are available, and the library of Congress and that of the Surgeon-General at Washington are accessible by post. Visiting communion with many other laboratories in the country is established and flourishes. Field work is carried on by expeditions; regions where malaria, hookworm, and soil pollution are prevalent are easily accessible. Since its organization in 1918 the department has brought together representative collections, including living forms, for educational purposes; exchanges are solicited and additions are welcomed. Since 1918 the department has issued 63 publications, describing the results of various original researches.

A. A.

HAUGHWOUT (Frank G.). **Some Less Familiar Aspects of Parasitology.** —*Jl. Philippine Islands Med. Assoc.* 1921. May–June. Vol. 1. No. 3. pp. 93–99.

The author has a good deal to say on the old texts of all the philosophers—ancient and modern—that science must be pursued for its own sake; that the study of science for the sake of its practical applications is as barren and futile as the set pursuit of happiness; that the gainful applications of science are but unforeseen by-products; the texts, alas, are something musty. He, however, thinks that "there is a growing tendency on the part of the world to accept the principle"—the eternal truth—embodied in these texts, and he justifies his hopeful opinion by some consideration of the converse aspects of DARLING's attractive theorem that by examination of the intestinal worms of a people the geographical and ethnic origins of that people can, within certain limits, be divined. The unravelling of ethnological problems by a study of intestinal parasites is pure science, but science fruitful in practical applications. In the case of the Philippine Islands, where

the predominant species of hookworm appears to be the less malignant Necator, the author would apply this science to legislation for controlling the immigration of ethnological elements whose predominant hookworm is known to be the more malignant *Ancylostoma duodenale.* The paper is suggestive and stimulative and well worth reading.

A. A.

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GALLI-VALERIO (B.). **Beobachtungen ueber Culiciden, nebst Bemerkungen ueber Tabaniden und Simuliden.**—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Jan. 31. Vol. 87. No. 7/8. pp. 557–560.

HOUSSAY (B. A.) & NEGRETE (J.). **Proportions de neutralisation des venins par les sérums anti-venimeux.**—*C.R. Soc. Biol.* 1921. Nov. 26. Vol. 85. No. 34. pp. 999–1001.

LAWRENCE (Herman). **The Pathogeneity of the** *Demodex folliculorum.*—*Australasian Med. Congress, Transactions of the Eleventh Session held in Brisbane, Queensland, 21st–28th Aug., 1920.* pp. 543–544.

LEIVA (Lamberto). **Observations on** *Chilomastix intestinalis* **Kuczinski.**—*Jl. Parasit.* 1921. Dec. Vol. 8. No. 2. pp. 49–57. With 2 text figs. & 1 plate.

MARTINI (E.). **Ueber ein gutes Unterscheidungsmerkmal von** *A. plumbeus* **und** *A. bifurcatus.*—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 12. pp. 364–365.

MARTINI. **Ueber den Einfluss der Wasserzusammensetzung auf die Kiemenlänge bei den Mückenlarven.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 3. p. 82.

SAITO (Tokiwo). [**On the Intestinal Parasitism by the Larvae of the Fly, and some Experiments on the Larvae of** *Chrysomyia macellaria.*]—*Igaku Chuo Zasshi* (*Central Jl. of Med.*). 1921. Apr. No. 347. [Summarized in *Japan Med. World.* Tokyo. 1921. July 15. Vol. 1. No. 3. p. 21.]

SIKORA (H.). **Zur Unterscheidung von Kopf- und Kleiderläusen.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 3. p. 83.

SWELLENGREBEL (N. H.). *Myzomyia ludlowi* **Theob. parvient-elle à ressembler à** *Myzomia rossii* **Giles, quand elle vit en rapport intime avec cette dernière espèce ?**—*Bull. Soc. Path. Exot.* 1922. Feb. 8. Vol. 15. No. 2. pp. 120–122.

VOGEL (R.). **Ueber Vorkommen und Biologie von Anopheles im Bereich des Etappengebietes der 5. Armee (östliches Frankreich und angrenzendes Belgien).**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 9. pp. 279–284.


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## SLEEPING SICKNESS.

MURAZ (G.). **Essai de détermination de la limite Nord de la maladie du sommeil en Afrique équatoriale française. Travaux du secteur de prophylaxie du Tchad d'avril 1920 à avril 1921.**—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 253–280. With 1 map.

After spending almost a year working on sleeping sickness in the Upper Sangha district, the author went to the Chad region, which is the most northerly sector of French equatorial Africa, and spent from April, 1920, to April, 1921, investigating the state of affairs as regards sleeping sickness. A detailed account is given of the zones visited and of the amount of the disease found in each, and of the various measures of treatment and prophylaxis used. The paper is illustrated by a large scale map of the region.

The conclusions are :—

1. It appears that the disease has not been recently imported into Southern Chad. The depopulated villages (Kolo, Biokobo) on the Logone-Penndé bear witness to the fact that it has been endemic for a long time.

2. Sleeping sickness has become epidemic to Chad during recent years, especially along the Tandjilé, the Logone-Penndé, and the Bahr Sara. Large zones which are almost free (Koumra plateau and the Goule country) separate zones severely infested (50–90 per cent.).

In the whole sector 134,608 people have been examined within the year, and 3,071 cases have been diagnosed and treated.

3. The northern limit of the disease in French Equatorial Africa runs between 9° and 10° N., forming two great northern bends, of which the Chari and the Logone are the axes.

4. The extension of human trypanosomiasis to the north of the line is not to be feared :

(*a*) If the prophylactic work of the Chad sector is continued.

(*b*) If the rôle of the three "Poste filtres" at Fort Archambault, Laï and Léré is not interrupted.

(*c*) Because the geographical conditions seem opposed to its extension. The habitat favoured by *G. palpalis* is the forest country, which disappears almost at the northern line. If the combined efforts of the Chad sector and the three "Poste filtres" defend this Colony against endemo-epidemicity, the new geographical conditions which *G. palpalis* finds north of 10° N. assure us against extension of the endemicity.

5. In the Chad sector chemical prophylaxis gave excellent results. By means of it in 1920–21, the great epidemic foci have been stamped out in the Mayo-Kebbi, Moyen Logone and Moyen Chari.

6. The minimum atoxyl treatment—two massive doses at a day's interval each six months—is the only one compatible with active prophylaxis in the bush carried out by few people.

7. The suppression of porterage on the river up to Batangafo is under consideration. This important measure would certainly reduce the fatalities from trypanosomiasis, since the general condition of the native would no longer be ruined by the enormous strain involved.

W. Yorke.

JOJOT (Ch.). **Le secteur de prophylaxie de la maladie du sommeil du Haut-Nyong (Cameroun).**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Oct.–Nov.–Dec. Vol. 19. No. 4. pp. 423–442. With 1 plate and 1 map.

A detailed description is given of the efforts to combat sleeping sickness in the Haut-Nyong sector of the Upper Sangha district.

The conclusions are :—

More than 5,000 cases of trypanosomiasis have been diagnosed microscopically, provided with tallies, and atoxylized.

Ninety per cent. of these cases are regularly examined and treated.

The atoxylization causes at first the disappearance of trypanosomes from the periphery (blood and glands) in 95 per cent. of cases.

The mortality among the treated cases varies between 10 and 15 per cent.

Prophylactic and curative treatment are so much the more efficacious as the supervision of the cases is the more prolonged.

Sanitary stations are being multiplied for treatment of the sick, and they are provided with mobile bands, which are penetrating more and more intimately among the native population.

The results already obtained enlist the confidence and regard of the natives for the sanitary service : the author recommends multiplication of the native collaborators of both sexes and extension of their rôle, and appealing by persuasion and example in order to lead the entire population to participate in a work the beneficence of which they understand already and will realize more and more.

W. Y.

SCHWETZ (J.). **Extrait du Rapport de la Mission médicale antitrypanosomique du Kwilu-Kwango, 1920–1921.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. Dec. Vol. 1. No. 3. pp. 339–365. With 1 map.

In 1919 the author was put in charge of the sleeping sickness operations at Kwango. He proposed to organize the work as follows :—

A doctor, accompanied by several native hospital attendants, would be sent to examine the villages of a definite area with the object of discovering cases of the disease and of giving patients their first injection of atoxyl. After having examined 10–20 villages (according to the size of the villages, the distance between them, and the number of patients), a hospital attendant would be left to continue the treatment, which would consist of an injection of atoxyl every tenth day. Records of the patients and treatment administered were to be kept, and a copy sent to the sanitary officer who would visit the district sometime later, in order to control the work of the native hospital attendant, to ascertain the number of absentees, and to hunt out refractory cases.

When the doctor had visited in this way about 100 villages and placed seven or eight hospital attendants in charge—that is to say, after about three months—he would make another tour to see that everything

was being carried out properly. After the administration of 10 injections, that is, after a lapse of about six months, the region in question was to be temporarily abandoned, and the doctor, the sanitary officer and the hospital attendants to commence work in a neighbouring district. When the work was complete in the second district, the first was again to be visited to ascertain the results of treatment and to give a further series of 5 injections to all cases, whether they appeared well or not.

Diagnosis was to be made by means of gland palpation, and the use of the microscope reserved for special cases. The doses of atoxyl to be administered were 1 gm. for an adult and 0·5 gm., or less, according to the age, for children.

In practice the author found that his programme was too ambitious, and that instead of working simultaneously in three districts, they had to limit themselves, to begin with, at least, to a single region. The idea of employing in the same region two Europeans—a doctor and a sanitary officer—at the same time had to be abandoned. Owing to the number of villages to be examined, the great number of patients to be treated and the difficulties encountered, the hostility of the native, the lack of hospital attendants and the necessity of perpetually controlling their work, the author was compelled to divide the territory into several sub-districts, with a European in charge of each. Many other difficulties encountered are dealt with at length.

A detailed account of the work done in the Kikwit district is given, including geographical details, the character of the vegetation and the distribution of Glossina, including *G. tabaniformis*, which is fairly common in the forests around Kikwit, and *G. palpalis*, which is, in general, rare.

The population of the Kikwit region is about 100,000, of which over 73,000 were examined for sleeping sickness, and the sick to the number of about 9,000 treated.

Details are given in the following table :—

| Regions. | Number of Villages. | Number of Persons Examined. | Disease. | Per Cent. | No. of Persons Treated. |
|---|---|---|---|---|---|
| 1. Right bank Kwilu .. (Dr. David). | 239 | 17,082 | 2,131 | 12 | 2,835 |
| 2. Triangle Kwilu-Kwengo (Dr. Segers). | 21 | 1,371 | 266 | 19·4 | 245 |
| 3. South de Kikwit .. (Dr. Schwetz). | 48 | 8,214 | 1,325 | 16·1 | 1,148 |
| 4. Lutshima .. .. (Dr. Baumann). | 71 | 14,372 | 2,022 | 14 | 1,878 |
| 5. West Bas-Kwengo .. (Dr. De Wolf). | 39 | 3,829 | 663 | 17·3 | 605 |
| 6. South-west of the basin Kwengo .. .. (M. Demaret). | 203 | 28,681 | 2,515 | 11·4 | 2,307 |
| Total .. | 621 | 73,549 | 8,922 | 12·1 | 9,018 |

The paper is illustrated by an excellent map of the Kikwit district.

W. Y.

BASSETT-SMITH (Percy). **Case of Trypanosomiasis from West Africa cured by Antimony.**—*Brit. Med. Jl.* 1922. Feb. 25. p. 311.

Further details are given of a case of sleeping sickness contracted in the Cameroons in 1915 (see this *Bulletin*, Vol. 13, p. 260). Atoxyl controlled, but did not eradicate, the infection. Under antimony treatment the blood cleared rapidly. In May, 1917, there was a relapse, which again subsided on the administration of antimony. The patient had a course of 10 injections of ½ to 2 gr. of tartar emetic each spring in 1918, 1919 and 1920. The author concludes that the case may now be claimed as a severe infection of *T. gambiense* cured by repeated injections of antimony.

W. Y.

LOW (George C.) & NEWHAM (H. B. G.). **Case of Trypanosomiasis from Portuguese East Africa apparently Cured.**—*Brit. Med. Jl.* 1922. Jan. 21. pp. 96–97.

Further details are given of the case of a sleeping sickness patient who three years after acquiring an infection of *T. rhodesiense* in Portuguese East Africa is apparently well and in good health [this *Bulletin*, Vol. 15, p. 36]. The patient was infected in October, 1918, in the Lugenda River valley, and trypanosomes were found in the blood on October 16. Treatment consisted of intravenous injections of tartar emetic. In January, 1919, the patient was transferred to Durban, and came under the care of Dr. MURRAY. A prolonged course of treatment was commenced on January 21, and was continued till the patient was sent to Johannesburg on October 8, 1919. Here he was kept under continual observation and treatment until May 7, 1920. A few trypanosomes were found in the blood on his arrival at Johannesburg, but not between October 17, 1919, and April 8, 1921, in spite o daily examinations.

The total medication at the commencement of treatment on November 19, 1918, to April 8, 1921, was as follows :—

| | | |
|---|---|---|
| Atoxyl .. .. .. .. .. .. | 13 | gr. |
| Soamin .. .. .. .. .. .. | 234 | gr. |
| Nucleoarsitol .. .. .. .. .. | 13·5 | cc. |
| Galyl .. .. .. .. .. .. | 0·5 | gm. |
| Liq. arsenicalis—a little on hospital ship between Dar-es-Salaam and Durban. | | |
| Tartar emetic .. .. .. .. .. | 363 | gr. |
| Antimony oxide .. .. .. .. | 4·75 | gr. |

On April 29, 1921, the patient was sent to England, and was admitted to the Hospital for Tropical Diseases, London. As there were no signs of disease, it was resolved to stop treatment. Blood examinations were uniformly negative, as were also sub-inoculations into guinea-pigs and rats. In July, 1921, he complained of the sight in one eye, and was examined by Colonel ELLIOT, who reported that there was a patch of paracentral choroido-retinitis in the right eye, a condition only twice before reported in human trypanosomiasis.

The authors say that it is difficult to be certain whether the patient was really cured. Tremors of the hands seem to be definitely increasing and the general condition, although very good, is not perfect.

During the autumn months of 1921 the patient kept well; he returned to hospital for another examination in November. A lumbar puncture was made with negative results

W. Y.

COLIN (H.), LAIGNEL-LAVASTINE & MOURGUE (R.). **Étude clinique et anatomo-pathologique sur un cas de syndrome paralytique à trypanosomes.**—*L'Encephale.* 1919. Dec. (9e–14e année. 2e sem.). No. 10–12. pp. 311–329.

The authors describe in great detail the clinical history and pathological lesions found in a case of sleeping sickness from the Upper Sangha.

The patient did not develop cerebral symptoms until ten years after infection. The chief post-mortem findings were extraordinarily well-marked lesions in the central nervous system, which were essentially meningo-vascular. There was a superficial infiltration of the pia mater, and of the vascular zones of His, with lymphocytes and plasma cells.

The article is illustrated by two plates: the first, a low power magnification of the cerebral substance showing the extraordinarily well-marked perivascular infiltration, and the second, a high power magnification of a vessel showing the characters of the cells constituting the perivascular infiltration.

The authors were of opinion that the fact that the morbid meningo-vascular changes had attained such a high degree of development was due to the prolongation of life as a result of therapy.

W. Y.

TROUT (Charles Lewis). **Treatment of Trypanosomiasis by Various Methods.**—*Jl. Trop. Med. & Hyg.* 1921. Dec. 15. Vol. 24. No. 24. pp. 321–322.

After referring to MARSHALL's recent articles on the treatment of trypanosomiasis by intrathecal injections of salvarsanized serum, the author states that various groups of from three to five cases in each group are being treated by the Swift-Ellis auto-serum technique with the following drugs: galyl, tincture of iodine (4–7 drops in distilled sterile water injected slowly, repeated twice before removing blood), urotropine (10 per cent. solution injected twice before drawing blood) and tartar emetic. Galyl, urotropine and tartar emetic cases are reported all to have improved.

Another group of five advanced cases are being treated by a plan based on Duncan's autotherapy method. Blood (containing trypanosomes), 20 cc., is withdrawn into a sterile tube, and some time later triturated with ground glass very thoroughly in a sterile mortar and 200 cc. of distilled sterile water gradually added. The solution is allowed to stand and then passed through a Berkefeld filter. About 100 cc. of the filtrate is injected. A number of early cases have been treated simply with their own serum, no drugs being administered. Sufficient time has not yet elapsed to reach conclusions as to the value of any of these drugs for treatment.

W. Y.

LEFROU & OUZILLEAU. **La thérapeutique intra-rachidienne dans la maladie du sommeil.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 59–80.

The authors summarize the various methods of intrathecal treatment of human trypanosomiasis which have from time to time been recorded. They deal first with the observations relating to intrathecal injections of trypanocidal substances, *e.g.*, salvarsan and neosalvarsan, emetic and collosol trisulphurate of arsenic (Thiarsol). Having obtained a supply of the last-named drug from the Maison Clin, the authors, before administering it intrathecally, decided to try it intravenously on four early cases who exhibited trypanosomes in the glands or blood, but whose cerebrospinal fluid was normal. The injections were well borne, but gave rise to a transient febrile reaction—38° C. after 1 cc. (0·002 gm. As) and 40° C. after 2 cc. The results were not very satisfactory, as in three of the patients the trypanosomes remained in the blood. Notwithstanding this, the authors thought that possibly the drug might act better intrathecally, as the volume of the cerebrospinal fluid is so much less than that of the blood. It was consequently given in doses of 1 cc. intrathecally in three patients whose cerebrospinal fluid contained parasites; two injections being given in each of the first two cases and one in the third. The results were unsatisfactory after a temporary disappearance of the parasites; the patient became paraplegic, the progress of the disease was accelerated and the patient died.

The authors next considered the various methods of intrathecal serum therapy with salvarsanized and atoxylized serum. Much astonished at the results obtained by MARSHALL [this *Bulletin*, Vol. 19, p. 141], they decided to repeat the experiments. Four patients, the cerebrospinal fluid of whom contained trypanosomes and a definite increase of cellular elements, were treated with salvarsanized serum. In none was the cerebrospinal fluid sterilized or the cellular elements reduced in number; three of four died, and the fourth was subsequently given injections of atoxyl subcutaneously and improved in condition. Details are also given of a number of cases treated with atoxylized serum. The authors point out that in work of this sort it is necessary, in order to appreciate the value of the intrathecal injection, to know the influence exerted by each of the two factors which compose the treatment, *i.e.*, the intravenous injection of neosalvarsan or the subcutaneous injection of atoxyl, and the intrathecal injection of the serum. Details are given of five cases treated only by intravenous injections of neosalvarsan, and of five treated by injections of atoxyl or emetic. In all of these the effect of treatment on the cerebrospinal fluid was observed by frequent lumbar punctures. The authors infer from the results that injections of neosalvarsan or atoxyl alone produce the same effect as the injection of the serum.

The next section is devoted to criticism of MARSHALL's papers; this is, in the main, very similar to that of the reviewer [this *Bulletin*, Vol. 18, pp. 155–174]. Referring to MARSHALL's assertion that after a single injection of neosalvarsan or atoxyl symptoms reappear in about four months, and the disease progresses to a fatal issue, the authors give details of five cases, recorded in the archives at the Pasteur Institute, Brazzaville, who, although they had only one or

two injections, were alive and in excellent health 6–12 years afterwards. They also give details of another case, the cerebrospinal fluid of which was infected; this was sterilized and the patient possibly cured by two intravenous injections of neosalvarsan.

The paper ends with certain general conclusions on intrathecal therapy, in which the authors state their belief, on physiological and pathological grounds, that the intrathecal path does not present any superiority over the blood path as a means of reaching the cerebrospinal system.

W. Y.

BRODEN (A.) & RODHAIN (J.). **L'Atoxyl dans le traitement de la trypanose humaine.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. May. Vol. 1. No. 2. pp. 179–226.

The object of this paper is to complete, and in part to confirm, the conclusion reached in Rapport iii of the Leopoldville Laboratory (1908). [*Sleeping Sickness Bulletin*, Vol. 1, p. 190.] The authors consider successively the effect of atoxyl (*a*) in doses of 0·5 gm. every tenth and eleventh day as recommended by KOCH, (*b*) in weekly doses of 1 gm., and (*c*) in doses of 0·5 gm. every fifth day.

In presenting their records, the authors have grouped their cases into two classes: (1) those in the first stage of the disease, and (2) those in the second stage. The former comprises those who exhibit glandular enlargement, fever, slight acceleration of the pulse and a normal cerebrospinal fluid, or at most one with only a slight leucocytosis; all cases exhibiting any nervous trouble are grouped in the second category, irrespective of their general condition.

Details are given of 165 cases treated with atoxyl alone by one of the above methods, and also of 17 cases which received another form of atoxyl treatment consisting of oral administration alternating with subcutaneous injection, sometimes combined with a little mercury.

*Patients in the second stage of the disease :—*

Of 40 patients treated by method (*a*), 16 are dead; there is no instance of apparent cure, and 7 cases developed severe visual troubles, 4 becoming blind.

Of 2 patients treated by method (*b*), 1 died and the other is not cured.

Of 5 patients treated by method (*c*), 2 died and the remaining 3 are not cured.

Of 8 patients treated by other atoxyl methods, 3 are dead and none are cured.

Thus, of 55 patients treated in the second stage of the disease, none were cured.

*Patients in the first stage of the disease :—*

Of 77 cases treated by method (*a*), 21 were apparently not cured.

Of 30 cases treated by method (*b*), 8 were apparently not cured.

Of 11 cases treated by method (*c*), none were observed for a period sufficiently long to warrant the expression of any opinion.

Of 9 cases treated by other atoxyl methods, 4 were apparently not cured.

Thus, of the 127 patients in the first stage of the disease treated with atoxyl for months by various methods, 34 are apparently not cured: the proportion of failures is then 26·7 per cent. for an observation period in general considerably less than two years.

The authors have not considered in the above classification the number of cases apparently cured, because the observation period in some of them was too short, and because more than half the cases were not followed up.

The general deduction appears to be that one cannot hope to obtain a cure by atoxyl alone in patients in the second stage of the disease. Nevertheless, the drug has a very marked relative utility, in that it sterilizes the peripheral circulation and ameliorates for the time being the general condition of the patient.

Although atoxyl proved insufficient in 26·7 per cent. of patients in the first stage of the disease, it is nevertheless certain that a number of the patients of this category have been definitely cured.

Reference is made to the fact that grave ocular troubles, including atrophy of the optic nerve and blindness, were met with. Of 117 patients treated by KOCH's method, severe visual disturbances occurred in 10 and blindness in 7 cases. The 65 patients treated by other methods did not yield a single case of blindness. The authors state, however, that they do not wish to ascribe this disaster as peculiar to KOCH's method.

In answer to the question "Which is the best method of administering atoxyl?" the authors conclude that method (*b*), *i.e.*, a weekly dose of one gramme, is preferable.

They next consider what ought to be the duration of atoxyl treatment, and conclude that in patients in the second stage of the disease, it ought never to be definitely stopped, but only interrupted from time to time. With regard to those in the first stage of the disease, the question is more difficult. In the most favourable circumstances the duration of the first treatment should not be less than 4–6 months, and it should be followed, after intervals more or less prolonged, by shorter periods of treatment.

W. Y.

i. VAN DEN BRANDEN (F.). **A propos de l'Iodosalyl dans la trypanosomiase humaine.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. May. Vol. 1. No. 2. pp. 163–164.

ii. ——. **Action de l'hexaméthylènetétramine "urotropine" dans la Trypanosomiase humaine.**—*Ibid.* Dec. No. 3. pp. 267–269.

i. Iodosalyl even when administered in larger doses than those recommended by DANIEL [this *Bulletin*, Vol. 15, p. 43 & p. 389] has no appreciable action in trypanosomiasis, nor is it of any value when given as an adjunct to tartar emetic or soamin.

ii. As a result of treating two cases of sleeping sickness with urotropine, the author concludes that this drug, even when administered in larger doses than those used by PELLETIER [this *Bulletin*, Vol. 17, p. 330], has no action beyond that of a general stimulant.

W. Y.

BRODEN (A.). **Action du Trypanbleu sur** *Trypanosoma gambiense.*—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. Dec. Vol. 1. No. 3. pp. 281–285.

Trypanblue given orally in doses of 18 gm. in three days to natives infected with *T. gambiense* had no effect on the disease; and similarly when given intravenously in doses varying from 0·2–0·8 gm. it failed to cause the disappearance of trypanosomes.

W. Y.

MAYER (Martin) & ZEISS (Heinz). **Ueber die Wirksamkeit des Serums mit "Bayer 205" vorbehandelter Kaninchen.** [On the Activity of the Serum of Rabbits treated with "Bayer 205."]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 9. pp. 259–271.

The serum of healthy rabbits previously treated with "Bayer 205" in doses of 0·4 gm. per kilo of body-weight is therapeutically active for *T. brucei, T equinum* and *T equiperdum* infections, and it is possible to cure mice and rats infected with these parasites with rabbit serum removed up to 51 days after treatment with "Bayer 205." The earlier after treatment the serum is withdrawn the greater its therapeutic activity; after the 38th day a slow but steady decrease in the protective power of the serum sets in, and from this time onwards the effects are mainly only transient.

Serum heated after dilution to 56° C., and even up to 100° C., remains completely active.

*T. gambiense* and *T. rhodesiense* appear to be more able to resist the effect of "Bayer 205" serum than the above-mentioned trypanosomes, and it is possible to drive them out of the blood of experimental animals by the injection of the serum for a few days only; relapses occur and death results.

Reinoculations were made in 16 animals cured by the treated serum two to four months previously and 13 became infected, but the incubation period and course of the infection was greatly prolonged. Two animals inoculated with *T. equiperdum* remained healthy during an observation period of 146 days, and the remaining animal died of an intercurrent disease.

These observations show that the activity of the serum is not due to any changes in the blood, but to the drug actually circulating in the blood for prolonged periods. In a foot-note the authors refer to a previous paper written in conjunction with GIEMSA and HALBERKANN (*Revista médica de Hamburgo*, 1921, No. 5), in which they showed that the drug is bound up with the proteins of the serum

W. Y

MAYER (Martin) & MENK (W.). **Ueber die Ausscheidung von "Bayer 205" in wirksamer Form im Harn behandelter Menschen und Tiere.** [The Secretion of "Bayer 205" in Active Form in the Urine of Treated Men and Animals.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 12. pp. 376–379.

By means of its therapeutic action on trypanosome infections, the presence of "Bayer 205" was demonstrated in the urine of a dog up to the ninth day after treatment, and in that of a man up to the fifth day after treatment.

W. Y.

MAYER (Martin). **Ueber intralumbale Behandlung mit "Bayer 205" bei Trypanosomenkrankheiten.** [On the Intrathecal Treatment of Trypanosomiasis with "Bayer 205."]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 12. pp. 375–376.

In a previous paper the author, in conjunction with NAST and ZEISS, recorded the cure of a rabbit severely infected with dourine by intralumbar injection of "Bayer 205." Details of two other similar cases—one a dog and the other a guinea-pig—are given in this paper. The dog, which weighed 14,100 gm., was given 0·7 gm. of the drug and the guinea-pig 0·02 gm. The author recommends that in cases of trypanosomiasis doses of from 0·5–1 gm. should be given in the first experiments on intrathecal therapy.

W. Y.

MAYER (Martin). **Ueber orale Behandlung und Prophylaxe der Trypanosomenkrankheiten mit "Bayer 205."** [On Oral Treatment and Prophylaxis of Trypanosomiasis with "Bayer 205."]—*Muench. Med. Woch.* 1922. May 12. Vol. 69. No. 19. pp. 702–703.

A goat was inoculated with a virulent strain of *T. rhodesiense* [see this *Bulletin*, Vol. 19, p. 134] on December 9, 1921. Trypanosomes were found in its blood on December 15, and were present in great numbers until January 25, 1922. From January 8 onwards severe symptoms manifested themselves. Oral treatment with "Bayer 205" was begun on January 17, the following doses being given :—

| | | | |
|---|---|---|---|
| January 17 | .. 1 gm. | January 25 | .. 7 gm. |
| ,, 18 | .. 2 gm. | ,, 26 | .. 10 gm. |
| ,, 19 | .. 2 gm. | ,, 27 | .. 10 gm. |
| ,, 23 | .. 3 gm. | ,, 28 | .. 10 gm. |
| ,, 24 | .. 5 gm. | | |

The result was remarkable; after the administration of 20 gm., trypanosomes had disappeared from the blood and the symptoms rapidly subsided. During an observation period of 13 weeks the animal remained healthy and its blood negative, and subinoculated animals did not become infected.

A second goat was given by the mouth 20 gm. of "Bayer 205"; this dose was well borne, and albuminuria was not observed. A week later it was inoculated with the above strain of *T. rhodesiense*. It did not become infected, and the drug could be demonstrated in its blood by the biological test for three weeks after administration.

W. Y.

MAYER (Martin). **Richtlinien für die Anwendung von "Bayer 205" bei Trypanosomenkrankheiten.** [Right Lines for the Use of "Bayer 205" in Trypanosome Infections.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 2. pp. 33–37.

The following rules relating to the administration of "Bayer 205" are laid down for general guidance.

1. The drug is very soluble in water and can be sterilized by heating in a water bath for 15 minutes, but solution in sterile water renders

this unnecessary. Solutions are stable for a long time, but it is desirable to employ fresh solutions. Mayer advises 10 per cent. solution for use in man and the larger animals.

2. It can be given intravenously, subcutaneously, intramuscularly, intrathecally, and orally. The first is best, but in small animals subcutaneously is equally good.

3. The dose tolerated, so far as is yet known, is:—Mice 0·01 gm. per 20 gm. of body-weight, guinea-pigs 0·3 gm. per kilo, rabbits 0·3–0·5 gm. per kilo. For horses, PFEILER recommends 1 gm. per 50 kilos (cwt.) within 14 days, and he gave up to 7 gm. at a single dose, but doses of even 0·3 gm. per 50 kilos may produce exanthema. Sometimes animals die a week or more after the administration of large doses as the result of kidney changes.

4. Large doses act on the blood and on the kidneys; destruction of erythrocytes and anaemia and albuminuria results. After lethal doses there are haemorrhages. Albuminuria is especially to be observed in man, sometimes after quite small doses, and even after quite exceptionally large doses it is not severe. It is important to remember that albuminuria does not appear immediately after an injection, but sometimes some days afterwards. In experiments the object of which is to produce sterilization by means of a single large dose, a great leucocytic reaction may be observed in addition to the damage to the red cells, which, perhaps, is related to the sudden disappearance of parasites, and death through shock may result.

5. The drug circulates in the blood for weeks and even months, and consequently repeated doses must have a cumulative effect. Mayer strongly advises, for the present, the administration of small doses at intervals of several days. Urine examination is necessary, and the appearance of considerable albumen is an indication to stop. Men should be given 0·5 gm. at first, and, if this is well borne, 24 to 48 hours later 1 gm. intravenously; up to 3 gm. can be given within a week, then at least 14 days interval with careful examination of urine. Large quantities should only be given when the drug is well borne. In slight cases and for prophylaxis, 1–2 gm. can be given each four weeks. For intrathecal treatment and severe cases which no longer react to intravenous injections, 0·05 gm. should be given to begin with. Details are given regarding the doses which should be administered to horses and other domestic animals.

6. Trypanosomes frequently do not disappear from the blood until the second or third day after treatment. Sometimes after several weeks single trypanosomes appear in the blood for one or more days, and then without further treatment disappear completely.

7. Cured animals remain immune against homologous and other pathogenic trypanosomes for weeks and months. The length of the immunity varies directly with the size of the dose and inversely with the size of the animal.

8. The drug can be used as a prophylactic, either by giving large doses at long intervals or small doses at short intervals.

9. The degree of immunity can be increased by reinoculating (either naturally or artificially) cured or prophylactically protected animals shortly after treatment.

10. The serum of treated animals and man is of therapeutic value in cases where the drug itself cannot be given. Of especial value is the

serum of animals treated with a large dose of the drug, removed 24 hours to a few days after the injection (possibly this is suitable for intrathecal treatment).

11. Good results have been obtained by intrathecal treatment, either with the drug or with the serum of treated animals, in dogs, rabbits and guinea-pigs in which the spinal canal is infected.

12. A few observations have been made on the oral administration of the drug. Much larger doses are tolerated by this method (in man over 5 gm.).

13. In Mayer's experiments it proved very difficult to obtain the drug-fast strain in small animals.

14. The value of the drug has yet to be tested on other protozoa and worm infections which react to arsenic and antimony preparations, but care must be taken in the treatment of diseases with derangement of the kidney.

W. Y.

PFEILER (W.). **Kasuistische Mitteilungen ueber ein anscheinendes Versagen der Bayer 205-Behandlung bei an natürlicher Beschälseuche leidenden Pferden.** [Remarks on an Apparent Failure of "Bayer 205" in the Treatment of Horses suffering from Natural Dourine Infection.]—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Mar. 14. Vol. 88. No. 1. pp. 48–53.

This paper deals with the official reports from Thuringia regarding the treatment by veterinary practitioners of 116 cases of dourine with "Bayer 205"; other cases were also treated, but information concerning them is deficient, and even in some of the 116 cases it is not satisfactory.

For purposes of compiling a report the following classification was prearranged :—

1. Cases in which the drug proved from the first to be inactive. This class of case, where an influence on the disease was not to be seen, was not observed, if one does not consider here undoubted or absolute "Bayer 205"-resistant cases.

2. Cases in which the action of "Bayer 205" is only unsatisfactory and notwithstanding sufficiently long treatment does not lead to a cure. Details are given of a case which falls under this head.

3. Cases in which the drug produces powerful reactions which prevent its further employment. This class of case has not been noted.

4. Cases in which the cure is only apparent, and after shorter or longer intervals relapses occur. Details are given of several cases which fall under this head.

From the above it appears that in a number of cases "Bayer 205" is perhaps a failure.

Considering all the facts, the results hitherto obtained in the treatment of the remaining late cases of dourine are to be regarded as especially gratifying.

W. Y.

NAVARRO (Augusto). **Traitement des trypanosomiases expérimentales par les acides arsiniques.**—*C. R. Soc. Biol.* 1921. Nov. 26. Vol. 85. No. 34. pp. 976–978.

The author has examined the therapeutic and toxic effects of several organic preparations containing arsenic in the pentavalent form.

The most favourable results were obtained with the sodium salt of 3-amino-4-hydroxyphenylarsinic acid (189). Other products examined were sodium acetylaminohydroxyphenylarsinate (190), sodium aminohydroxyphenylarsinate carbamide (*l'urée de l'aminooxyphényl arsinate de soude*) (199), the sodium salt of phenylaceticarsinic acid (187), dimethylaminobenzylarsinic acid hydrochloride (188), the sodium salt of the benzarsinamide of aminophenylacetic acid (201).

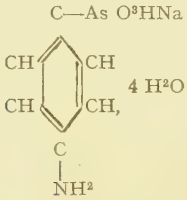
The effect of "189" was determined on *T. brucei* and *T. rhodesiense.* The dose tolerated by mice of 20 gm. varied from 0·030 to 0·035 gm. according to the degree of purity of the drug. [The author means by the dose tolerated that which did not produce nervous symptoms.] The fatal dose is 0·040 gm. It was found that 0·007 gm. injected under the skin always cured mice infected with *T. brucei* and *T. rhodesiense.* The ratio of the curative dose to the dose tolerated is therefore 1 to 5, which is much better than that of atoxyl, in which it is 1 to 2, and that of arsenophenylglycine, where it is 1 to 3.

Product "190" is slightly less toxic than "189," but it is much less active ; the other drugs were either very toxic or of little therapeutic value.

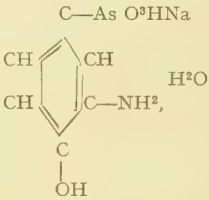
W. Y.

NAVARRO-MARTIN (Augusto). **Sur l'emploi de l'aminophénolarsinate de soude dans le traitement des trypanosomiasis.**—*Ann. Inst. Pasteur.* 1922. Jan. Vol. 36. No. 1. pp. 38–45.

The author examined the therapeutic value of aminohydroxyphenylarsinate of sodium (189) on mice infected with *T. brucei* and with *T. rhodesiense.* He gives the formula of the drug and, for comparison, that of atoxyl ; they are as follows :—




Atoxyl.




Aminohydroxyphénylarsinate de soude.

Experiments showed that aminohydroxyphenylarsinic acid (189) exerts a powerful trypanocidal action : its therapeutic coefficient (curative dose : tolerated dose) is less than 1 : 5. It produces nervous symptoms only when used in doses 5 or 6 times as great as the curative dose. In the form of the monosodium salt (diluted 6 to 13 times) it can be injected subcutaneously without causing trouble.

W. Y.

NAVARRO-MARTIN (A.) & STEFANOPOULO (G. J.). **Action de l'amino-phénolarsinate de soude (189) sur les trypanosomiases expérimentales du Cobaye.**—*C.R. Soc. Biol.* 1922. Apr. 1. Vol. 86. No. 13. pp. 702–703.

This paper is a continuation of that summarized above. The therapeutic value of "189" was tested on guinea-pigs infected with nagana and with *T. gambiense*. The animals were treated with doses varying between 0·03 gm. and 0·3 gm. per kilo of body-weight. In the nagana series of animals some were cured by a dose of 0·05 gm., and all with a dose of 0·1 gm. per kilo. For the guinea-pig the therapeutic coefficient (curative dose over the dose tolerated) varies from 1 : 3 to 1 : 6. Very similar results were obtained with the *gambiense* series of animals, in which the therapeutic coefficient varied from 1 : 4 to 1 : 5. The drug is given subcutaneously.

W. Y.

ADLER (S.). **The Trypanocidal Effect of Phenylglycine Amido Arsenate of Sodium on *T. brucei* in Rats and *T. rhodesiense* in Mice.**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 427–432.

The conclusions are :—

"Phenylglycine amido arsenate of sodium can be used in freshly prepared solutions in distilled water for intraperitoneal injection into rats and mice; the solutions on standing become toxic, and later become yellow in colour.

"For rats, the minimum lethal dose of the freshly prepared drug proved to be 1·2 gm. per kilo of body-weight.

"For rats infected with *T. brucei*, the minimum curative dose is 0·7 gm. per kilo of body-weight.

"*In vitro* the drug has no appreciable action on trypanosomes, nor has the blood of treated animals immediately (twenty-four hours) after becoming trypanosome-free.

"The drug has no curative effect on mice infected with *T. rhodesiense*.

"A remarkable feature of this drug is its relatively high minimum lethal dose. Although the drug contains 26 per cent. arsenic, the minimum lethal dose was found to be 1·2 gms. per kilo for rats and 3 gms. for mice."

W. Y.

YAKIMOFF (W. L.) & WASSILEWSKY (W. J.). **Expérimentation avec le "Dissodoluargol" de Danysz.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. p. 640.

Dissodoluargol has the advantage over luargol of being soluble in water without the necessity of adding soda. The lethal dose for a mouse of 20 gm. is 1 cc. of a 0·5 per cent. solution, 1 cc. of a 0·4 per cent. solution being tolerated. Therapeutic experiments show that the two drugs are of unequal value. The active dose is the same, *e.g.*, 1 cc. of a 0·11 solution for a mouse of 20 gm.

W. Y.

FROUIN (A.) & GUILLAUMIE (M.). **Action des sels de rhodium, de bismuth, de terres rares et de niobium dans le traitement du nagana chez la souris.**—*C. R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 446–448.

Repeated subcutaneous injections of 0·4 cc. to 1·2 cc. of a 0·5 per cent. solution of the citrate of niobium and sodium had no effect on mice infected with nagana. The subnitrate of bismuth—1 per cent. solution in 10 per cent. mannite—caused the disappearance of the trypanosomes and a prolongation of the life of the animals. The bismuth solution given in conjunction with salts of cerium had much the same effect, as did also combinations of bismuth with the salts of yttrium. Solutions of chloride of rhodium (1 per cent.) given subcutaneously prolonged life for 2 to 10 days, without causing disappearance of trypanosomes, possibly through increasing the resistance of the animals or by neutralizing the toxins of the parasite.

W. Y.

ADLER (S.). **Note on Bismuth as a Trypanocide.**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. p. 433.

The effect of bismuth in the form of the soluble bismuth sodium tartrate in solutions of various strengths was tried on mice and guinea-pigs infected with *T. rhodesiense* and *T. brucei* (ferox). In no case was a cure obtained.

W. Y.

KRAUSE (M.). **Trypanocide Wirkung methylierter Fuchsinderivate und gekuppelter Safraninderivate.** [The Trypanocidal Action of Methylated Fuchsin Derivatives and of Coupled Safranin Derivatives.]—*Zeitschr. f. Physikalische u. Diatetische Therap.* 1919. Vol. 33. pp. 231–237.

This chemical paper is of a technical nature and should be consulted in the original by those interested. The author prepared synthetically highly-methylated fuchsin derivatives and tested three of these, which he designated respectively Trypafuchsin 1, 2 and 3, according to the number of methyl groups. The drugs were given *per os* to rats and guinea-pigs infected with *T. gambiense*, *T. rhodesiense* and *T. congolense*; they can also be given subcutaneously without damage to the animals. It was found that the preparation which contained most methyl groups, viz., Trypafuchsin 3, had the best action.

W. Y.

ALTARA (Iginio). **Auto-antigeno, -emo e -siero terapia nelle tripanosomiasi sperimentali.** [Auto-Antigen, -Haemo and -Serum-Therapy in Experimental Trypanosomiasis.]—*Ann. d'Igiene.* 1921. Nov. Vol. 31. No. 11. pp. 681–687.

In these experiments the author used dogs infected with *T. lanfranchii*. The auto-antigen was prepared by withdrawing blood from an infected dog, defibrinating it, removing the layer immediately above the red cells and, after diluting it with sodium citrate solution, heating at 50° C. for 10 minutes. In the auto-haemotherapy experiments, blood was withdrawn from an infected dog shortly after the first crisis, when no parasites were to be seen in the blood; this was then heated

at 50° C. for 10 minutes, and about 10 cc. or 20 cc. reinjected. In the auto-serum therapy experiments blood was withdrawn during a crisis, allowed to clot, and the 25 cc. of the serum obtained injected the following day.

No beneficial results were obtained from these procedures.

W. Y.

NATTAN-LARRIER (L.). **Infections à Trypanosomes et voies de pénétration des virus.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 537–542. With 1 chart.

LAVERAN and MESNIL showed that the severity of infections and the duration of the incubation period in experimental trypanosomiasis varied according to the method of inoculation. The author examined this question in the case of *T. equiperdum* and *Schiz. cruzi* infections in the white mouse and guinea-pig. He found that when *T. equiperdum* was inoculated subcutaneously into mice the incubation period was longer, but the duration of the infection slightly shorter than when it was given intraperitoneally, and that these characters were even more marked when the virus had penetrated the skin or mucous membrane. When *Schiz. cruzi* was inoculated subcutaneously in guinea-pigs, the incubation period was longer than after intraperitoneal inoculation, but there was no alteration in the duration of the infection. When the virus was allowed to penetrate the mucous membranes of the mouse the incubation period was slightly prolonged, but the intensity of the infection was very much lessened.

W. Y.

VAN SACEGHEM (René). **Le pouvoir attachant du *Trypanosoma congolense-pecorum* variété *ruandae*, pour les hématies.**—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 203–204.

When fresh coverslip preparations of *T. congolense* var. *ruandae* are examined, it is seen that the great majority of the parasites are attached at their anterior extremity to red cells. Parasites which have been cultivated for 24 hours on Novy medium lose this power. This phenomenon is not observed in the case of trypanosomes exhibiting a rapid translatory movement, *e.g.*, *T. cazalboui*, and the author asks whether the attachment phenomenon exhibited by *T. congolense* is not for the purpose of distributing it rapidly throughout the organism of the host.

W. Y.

BESSEMANS (A.). **Valeur comparative des techniques de préparation de l'antigène destiné à la réaction de Bordet-Gengou pour le diagnostic de la dourine.**—*C.R. Soc. Biol.* 1922. Feb. 4. Vol. 86. No. 5. pp. 289–292.

The author has examined the various methods which have been devised for preparing antigen for use in the complement deviation test for dourine in horses. He found that aqueous or alcoholic extracts of organs of animals which had died from trypanosomiasis have a specific activity too feeble and too unequal to be of real use in the Bordet-Gengou reaction for the diagnosis of dourine in horses. Among the extracts of the blood of animals heavily infected with virulent trypanosomes, two only are good and of practical utility, viz., that of fractional centrifugation (LEVADITI-WATSON) and that of haemolysis by the

addition of 0·5 per cent. saponin (MOHLER-REYNOLDS.) The emulsion and the preservation of the deposit are best made in glycerine water. A comparative study of the last two procedures showed that in spite of its great anti-complementary power, the antigen of MOHLER and REYNOLDS is best because it provides a much greater number of doses.

W. Y.

ZANDBERGEN (K.). *Trypanosoma equiperdum* **en lage temperaturen.**—*Tijdschr. v. Vergelijkende Geneesk., enz.* 1922. Apr. 1. Vol. 7. Nos. 2 & 3. pp. 146–148. (French summary, p. 148. English summary, p. 149.)

The following summary is given :—

"In experiments with *Tryp. equiperdum* and low temperatures, I have found, till now, the following results :

"In the ice-box, the above trypanosomes are movable during 5 days and infectious only during 2 days.

"By—20° C. they lose mobility after 2 hours and 10 minutes, but are still infectious after 3 hours.

"By—40° C. they are immobile after 1½ hours, but infectious after 2¼ hours.

"By—145° C. they are still mobile after 35 minutes, after 45 minutes no mobility was to be seen, but, notwithstanding that, the blood was infectious.

"In liquid air (about —190° C.) the trypanosomes lose mobility after 9 minutes, but are still infectious after 25 minutes, after 30 minutes the trypanosomes were dead. The latter result is, as has been proved by later experiments, an exception."

W. Y.

TALIAFERRO (W. H.). **Variation and Inheritance in Size in** *Trypanosoma lewisi.* **i. Life-Cycle in the Rat and a Study of Size and Variation in "Pure Line" Infections. ii. The Effects of Growing "Pure Lines" in Different Vertebrate and Invertebrate Hosts and a Study of Size and Variation in Infections occurring in Nature.**—*Proc. Nat. Acad. Sci.* Washington. 1921. May & June. Vol. 7. Nos. 5 & 6. pp. 138–143. With 2 text-figs.; pp. 163–168.

i. The author writes : "The general plan of the present work on size in *T. lewisi* is to make a careful study of size and variability in a pure line and then, with this background, to attempt to explain the facts observed in infections occurring in nature. After a pure line infection was obtained, the following questions were attacked : (1) What are the mean and the coefficient of variation ? (2) Does growing the same 'pure line' in different vertebrate hosts cause significant differences in the mean size or in the coefficient of variation ? (3) Does passage of the 'pure line' through the invertebrate host cause significant differences in the mean or coefficient of variation ? This question gives us a chance to test the possibility that passage of the 'pure line' through the invertebrate host may cause a splitting up of the 'pure line' into heritably diverse lines. After a study is made of these questions we can attack the final one : (4) Does an infection occurring in nature consist of a large number of 'pure lines' such as has been described by Jennings and others in free-living protozoa which differ among themselves but are *per se* constant in size ?"

These questions cannot be approached with any degree of exactness until a thorough study is made of the changes in mean size and variability throughout the course of infection.

The first paper deals with these changes in size and variability and with the first of the questions enumerated above. The conclusions are :—

"We can draw the following conclusions from this part of the work; *Trypanosoma lewisi* reaches an 'adult' stage in its development in the rat in about 25 days after it appears in the blood. Once this stage is reached there is practically no division or growth. Due to the elimination of growth factors, the organisms show a very low coefficient of variations in 'pure line' infections, provided they are measured after the 'adult' stage is reached. These facts make *T. lewisi* a very favourable organism in which to study size and variation."

ii. In this paper the author endeavours to find answers to the last three questions enumerated above. His conclusions are as follows :—

"At the present phase of the work the following conclusions may be drawn: While growing the same 'pure line' in different rats may cause significant differences in the mean size, these differences are small. The differences in the mean are never greater when the 'pure line' is grown in different species of rats than when it is grown in different individuals of the same species. Passage of the 'pure line' from rat to rat is not followed by any significant changes in the coefficient of variation. In marked contrast to this it is found that passage of the 'pure line' through the flea is invariably followed by a significant increase in the coefficient of variation which is interpreted as showing that the 'pure line' breaks up into heritably diverse lines following such passage. Although passage through the flea has such a marked effect on the variability it has no significant effect on the mean size. 'Wild' infections occurring in nature exhibit differences in their mean sizes which are greater than can be explained by the fact that they occur in different rats. The coefficients of variation of 'wild' infections are, on the average, higher than for the 'pure line.' The lowest of these coefficients, however, is not greater than the coefficient of variation for the 'pure line' and even the highest can be explained on the assumption that the 'wild' infection consists of only a very few 'pure lines.' It seems probable that there occur, in nature as a whole, a large number of 'pure lines' which differ among themselves but are *per se* constant in size, but, due to the peculiar way in which rats receive their infections, a given infection consists of only a very few of these lines. In fact, a large number of 'wild' infections are probably actual 'pure lines.'"

W. Y.

RODHAIN (J.). **Sur la réceptivité des Roussettes épaulières,** *Epomophorus Wahlbergi Haldemani* (**Hallowel**) et *Epomophorus pusillus* (**Peters**) **aux** *Trypanosoma gambiense* (**Dutton**) et *congolense* (**Broden**). -- *Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 246–253.

In a previous note the author, in collaboration with VAN DEN BRANDEN, has shown that the large African bat, *Cynonycteris straminea*, is susceptible to *T. gambiense*, but resistant to *T. cazalboui* and *T. congolense* [this *Bulletin*, Vol. 8, p. 272]. In the present paper are recorded the results of inoculation of two other Congo bats, *Epomophorus wahlbergi haldemani* and *Epomophorus pusillus* with *T. gambiense* and *T. congolense*. Both proved to be susceptible to each trypanosome. *T. congolense* produced in each a fatal infection of an acute type, whereas *T. gambiense* produced an infection of a chronic type.

W. Y.

SERGENT (Edm.) & DONATIEN (A.). **Les stomoxes, propagateurs de la trypanosomiase des dromadaires.**—*C.R. Acad. Sci.* 1922. Feb. 20. Vol. 174. No. 8. pp. 582–584.

Trypanosomiasis in dromedaries in northern Africa is known to be disseminated by several species of tabanids, but recent work has shown that these are not the only vectors The authors have observed among dromedaries in paddocks an epidemic spread solely by stomoxys. The transmission, both by tabanids and stomoxys, is entirely mechanical; no evolution of the trypanosomes was observed in the insects. In order to transmit, the insects must bite an infected animal immediately before biting the healthy one.

W. Y.

i. YAKIMOFF (W. L.) & WASSILEWSKY (W. J.). **L'identification du trypanosome des chameaux du Turkestan et de l'Oural.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 637–638.

ii. ——. **A propos de l'identification du trypanosome des chameaux du Turkestan russe.**—*Ibid.* pp. 638–640.

i. The authors have examined the trypanosomes from camels in Turkestan and have compared them with those from Boukhara in the Urals.

A sheep inoculated in September, 1914, with the Ural strain became infected, but subsequently recovered, subinoculation from its blood the following February and April being negative. The serum of this animal protected mice, not only against the Ural strain, but also against the Turkestan strain, and consequently the authors conclude that the two are identical.

ii. In previous papers the author has shown that the dourine strain from Russia is identical with that from Algeria, and that the trypanosomes from donkeys at Boukhara are identical with those from camels in Turkestan, and finally that the Russian dourine strain is different from the Boukhara and Turkestan strains and from *T. brucei*. In this paper he shows that the trypanosome from Turkestan camels is not identical with the other camel trypanosomes, viz., *T. evansi* and *T. soudanense*. This conclusion is based on the protective action of the serum of immunized sheep. He proposes to give the trypanosome from Turkestan camels the name *T. ninae-kohl-yakimovi*.

W. Y.

VAN SACEGHEM (René). **La trypanosomiase au Ruanda.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. Dec. Vol. 1. No. 3. pp. 259–262.

The author found at Ruanda two species of pathogenic trypanosomes, viz., *T. cazalboui* and *T. ruandae* (*pecorum*, *congolense*). *T. ruandae* has no free flagellum and varies in length from 9–16$\mu$, and in breadth from 1·5–2$\mu$ or even 3$\mu$. Details are given regarding its pathogenicity and also of attempts at therapy of naturally infected animals. As a result of his work, the author concludes that *T. ruandae* must be regarded as synonymous with *T. congolense* (*pecorum*). Intramuscular injections of tartar emetic caused the trypanosomes to disappear from the blood in 7–10 days, but all attempts at treatment proved unsatisfactory.

Van Saceghem remarks that the existence of hyperleucocytosis in animals infected with *T. ruandae* is a good sign and, on the contrary, that lymphocytosis is an unfavourable sign.

W. Y.

i. VAN SACEGHEM (René). **Sérothérapie des trypanosomiases animales.**—*C.R. Soc. Biol.* 1922. Mar. 4. Vol. 86. No. 9. pp. 515–516.

ii. ——. **La sérothérapie dans le traitement des trypanosomiases.**—*Ibid.* May 6. No. 16. p. 981–984.

i. The object of this work was to determine whether the serum of animals infected with trypanosomes—but slightly active against the trypanosomes of the animal in question—could be utilized to cure the infection in another animal. The parasite used in the experiment was that recently described by the author under the name *T. ruandae* [this *Bulletin*, Vol. 17, p. 338].

Five goats were inoculated each with 5 cc. of blood from a heavily infected ox, and in 6–10 days all showed parasites in the circulation. When parasites appeared, three of the goats received 100 cc. of serum from a clinically infected ox, and the injections were repeated each week for five weeks. The trypanosomes did not disappear, but remained scanty in the blood for two months; three months later, the author was able to regard the animals as definitely cured. The two control goats died from the disease.

These experiments permit the conclusion that the serum of infected animals inoculated several times into another infected animal produces a cure.

ii. Indigenous sheep are but slightly susceptible to *T. ruandae* and the infection which results is chronic and ends in recovery; there exists in these animals a protective substance which prevents too great a multiplication of parasites and also prevents the trypanosome from becoming neurophil. Goats, on the other hand, are highly susceptible; the same protective substances are produced in them, but *pari passu* the trypanosomes become immune. As shewn, however, in the previous paper, the usual acute infection in goats can be made chronic by the subcutaneous injection of massive doses (100–200 cc.) of the serum of an animal (ox) which has been suffering for some months with the same infection. It appears, therefore, that great quantities of antibody inoculated into a recently infected animal in which the trypanosomes have not become resistant prevents them from becoming so. An animal cured by serum therapy is immune against reinfection.

W. Y.

FRANCHINI (G.). **Trypanosome de la chauve-souris en Italie. Formes viscérales et stades de développement chez un Acarien Gamaside, le *Leiognathus laverani* n. sp.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 542–546. With 2 text figs.

The author examined 100 bats (*Vesperugo pipistrellus*) caught in a farm situated in a marsh about 40 kilometres from Bologna, and found scanty trypanosomes in 30 of them. The parasite was small and pointed, sometimes angular in stained preparations; the centrosome was spherical and situated near the posterior extremity; the nucleus was oval, rather large, and situated anteriorly; the undulating membrane was narrow and the free portion of the flagellum of a considerable length. The trypanosome measured 8·5–10$\mu$ in length, and it had a free flagellum measuring 6–10$\mu$.

In smears of the liver and lungs leishmania forms were found. Multiplication of the parasite does not take place in the peripheral blood. Crithidial forms were not found.

Numerous lice and Acarids were found on the bats and were examined; nothing was discovered in the former, but in the latter belonging to the species *Leiognathus laverani*, crithidia and young trypanosomes were found.

The author writes with reference to the hypothesis of CHATTON and COURRIER regarding the relation between the trypanosome of the bat and epidemic goitre, it should be noted that in the whole of the province of Bologna and Ferrara, epidemic goitre does not exist.

W. Y.

ROSENTHAL (F.) & NOSSEN (H.). **Serologische Trypanosomenstudien. II. Mitteilung. Eine Serodiagnose verschiedner menschlicher Ikterusformen.** [Serological Trypanosome Studies. II. Communication. A Diagnosis of Varying Forms of Icterus in Human Beings.]—*Berlin Klin. Woch.* 1921. Sept. 12. No. 58. No. 37. pp. 1093–1097.

Reference is made to the first communication on this subject by ROSENTHAL and KRÜGER [this *Bulletin*, Vol. 19, p. 154] in which it was shown that the trypanocidal titre of human serum stands in very close relationship with the functional efficiency of the liver, and that in all probability the liver is the place of formation of the trypanocidal substance present in serum.

Details of an experiment are given showing that the trypanocidal properties of the serum had completely disappeared in a case of catarrhal jaundice, but that 14 days later during convalescence they had returned in full amount; another experiment is given showing the same phenomena in a case of jaundice after the administration of salvarsan. Further experiments showed that the phenomenon was not observed in cases of haemolytic jaundice and icterus in pernicious anaemia, but was given by cases of mechanical and catarrhal jaundice. In still another experiment the trypanocidal properties of the serum of a mother and that of a new-born child are examined; the former exhibited the trypanocidal action in normal degree, whilst in the latter it was almost completely absent. The paper should be studied in the original by those interested.

W. Y.

FRANCHINI (G.). **Sur un trypanosome du latex de deux expèces d'Euphorbes.**—*Bull. Soc. Path. Exot.* 1922. Jan 11. Vol. 15. No. 1. pp. 18–23. With 1 text fig.

Trypanosomes were discovered in the latex of two species of Euphorbia, viz., *Euph. nereifolia* and *Euph. coerulescens*. In fixed and stained preparations of the latex it was found that the parasites were of two types; the large forms measured 8–10$\mu$ (very rarely 12$\mu$) in length by 1–2$\mu$ in breadth, and the small forms 4–8$\mu$ in length and 1–1·5$\mu$ in breadth. The nucleus was round, very deeply stained, and generally situated in the anterior portion of the body. [In the figures it is depicted posterior to the middle of the body.] The blepharoplast was rod-shaped and lay posterior to the nucleus; the undulating membrane, when it exists, is slightly developed, and there is hardly ever any free flagellum. The parasite is named *T. euphorbiae*.

Franchini examined the various insects found in the vicinity of the Euphorbia with the object of ascertaining, if possible, what was responsible for the transmission of the trypanosomes. In various *Pentatomidae* he found in the gut, salivary glands and proboscis a crithidia; in *Pyrrhocoridae* he found herpetomonas in the coelomic fluid and in the salivary glands and proboscis; in various *Lygoeidae* he found both herpetomonas and crithidia; in *Muscidae* he found herpetomonas and more rarely trypanosoma; in *Culicidae* he found crithidia, herpetomonas, and sometimes trypanosoma, and in *Psychodidae* a few herpetomonas.

W. Y.

## MISCELLANEOUS.

FRANÇA (Carlos). **Existe-t-il un criterium pouvant nous guider dans l'application du traitement antirabique.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Dec. Vol. 1. No. 4. pp. 428–432.

In 1900 the author noticed that along with other lesions there is in the ganglionic tissue of rabid animals a remarkable local abundance of mast-cells, and that these by their vacuolation and loss of granulations are undergoing degeneration. It appears, therefore, reasonable to conclude that the virus of hydrophobia has some pronounced action on mast-cells.

In healthy adults submitted to antirabic treatment, towards the end of the graduated treatment, after the most virulent cords have been injected, there is a great increase of mast-cells, and increase of uninuclears, and a decrease of "polynuclears," and the percentage of eosinophiles is either normal or increased.

In two cases of untreated hydrophobia the author observed an inversion of the above specified leucocyte formula—the mast-cells and uninuclears were decreased and the "polynuclears" increased, and the percentage of eosinophiles was either normal or diminished.

Again, in a boy who showed symptoms of hydrophobia about the fourth day of antirabic treatment, the percentages of uninuclears and mast-cells were normal, the "polynuclears" were slightly increased, and the eosinophiles diminished.

Comparing these three phenomena, the author concludes that the combined increase of uninuclears and mast-cells, as seen in healthy adults who have received injections of the most virulent cords by graduation from non-virulent cords, indicates a successful posture of defence against the rabic virus; and that the opposite combinations seen in declared hydrophobia indicate failure of defence. If this conclusion be correct, the author argues that the treatment which by experiment brings about the "defensive" leucocyte formula—that is to say, the graduated treatment starting with non-virulent cords—is the rational treatment; also that in cases of severe bites or of delayed treatment the leucocyte formula should be investigated.

A. Alcock.

REMLINGER (P.). **Contribution à l'étude de l'atténuation du virus rabique fixe pour l'homme.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 233–235.

The author has often drawn attention to the profound difference between the virus of the rabies "of the street" and the fixed virus in use at antirabic institutions, and the present paper is an argument for commencing antirabic treatment with virulent cords and increasing the daily dosage, so as to shorten the duration of the course of treatment. In his own practice he now uses only cords dried over potash in an underground room (8°–10° in winter, 24°–26° in summer). His argument is countenanced by an unintentional experiment. By an unfortunate mistake a man bitten by a dog supposed to have been rabid, received, the same day, an emulsion of 2 cm. of what was practically a fresh unmodified cord. The mistake having been discovered he was put under antirabic treatment the next day, and was

started on 2 cm. of a six days' cord. The treatment was continued with cords of increasing virulence (five, four and three days) up to a term of fifteen days. The patient is now alive and in perfect health several months after the termination of his course of treatment.

A. A.

UMENO (S.) & DOI (Y.). **A Study on the Antirabic Inoculation of Dogs, and the Results of its Practical Application.**—*Kitasato Arch. Experim. Med.* 1921. Mar. Vol. 4. No. 2. pp. 89–108.

The contents of this interesting paper from the Kitasato Institute for Infectious Diseases, Tokyo, are sufficiently given in the author's summary, which is as follows :—

" 1. In Nippon, rabies prevailed since 1901, and year by year assumed a more and more severe disaster. In 1915 there were 1,424 rabid dogs, while 3,230 persons were bitten in the same year. Figures, however, have not risen to that maximum since, but in Kanagawa and Tokyo Prefectures they have still been increasing, and in 1918 there were 213 rabid dogs and 218 persons bitten in Kanagawa Prefecture alone, and 511 rabid dogs and 682 persons bitten in Tokyo Prefecture, while in the whole country there were 1,072 rabid dogs and 1,340 persons bitten, including the above mentioned figures.

" 2. Thus it had been found that the hitherto applied method of prevention of rabies, which was the killing of rabid dogs and all non-pet dogs, and the confinement of pet dogs, or the use of the muzzles, has proved insufficient to eradicate this dreadful malady. Prophylactic inoculation of healthy dogs, if possible, would, therefore, seem most desirable.

" 3. In the hope of attaining this desired result, the senior author Umeno prepared the antirabic vaccin from the brain and the spinal cord of a rabbit, which had been inoculated with the fixed virus. The preparation of the vaccin from that material was made just after the same method as his calf lymph vaccin is prepared. It is briefly as follows :— The brain, together with the spinal cord, were pounded in a mortar. One part of this pounded material was then mixed with 4–5 parts of phenolized glycerin-water. In order to diminish its virulence, this mixture was stored for a certain period of time either at room temperature or in the ice-chamber. The dose was 6·0 cc. of vaccin per 15 kilogram body weight of the dogs. This quantity of vaccin was injected in two different places. The sizes of the doses should, of course, be governed by the different races, ages, body weights, etc.

" 4. This vaccin was first experimentally used on 500 dogs. No vaccination losses occurred, nor were there any dogs that contracted the disease during the time of observation.

" 5. In Kanagawa Prefecture, the prophylactic vaccination of pet dogs has been practised since October 1918. Until the end of the same year, 6,644 out of 9,402 dogs were vaccinated. In 1919, 9,150 out of the 14,644 registered pet dogs were vaccinated. No vaccination losses occurred, nor were any cases of rabies developed after vaccination. It will thus be seen that in Kanagawa Prefecture, the entire annual number of rabid dogs has been growing less since the introduction of prophylactic inoculation ; for in 1919, during which year vaccination had been practically applied to a great number of dogs, the total annual number of rabid dogs decreased to four-fifths of that of the preceding year, while the number of the persons bitten during the same year decreased to three-fourths of that of the preceding year. All these rabid dogs had not been vaccinated.

" 6. Vaccination of dogs in Tokyo Prefecture was first introduced in May 1919. Until the end of that year 15,513 dogs had been vaccinated, of which one died after vaccination and one contracted hydrophobia. During the same year there were about 20,000 registered pet dogs, of which 13,177 were vaccinated during the seven months from May to December 1919. During the six months from October 1919, to March

1920, there was about one half of the total number of rabid dogs which had appeared during the corresponding six months from October 1918 to March 1919, whilst the total number of persons bitten were also only about one half of that for the corresponding six months one year before. All the rabid dogs, except the above mentioned one case, were non-pet dogs.

"7. By summing up the statistics obtained in Kanagawa and Tokyo Prefectures we obtain the following figures :—There were 31,307 vaccinated dogs, of which number there was only one case of vaccination loss and one in which the vaccination was not to be regarded effective enough. There appeared quite a number of rabid dogs among the non-vaccinated dogs. Thus we see the great importance of the vaccination of dogs in order to prevent the spread of rabies among dogs. The most rational prevention of rabies, therefore, would be the killing of all the non-pet dogs, and on the other hand, to vaccinate all pet dogs with lyssa vaccin. The authors hope that by these measures the total annihilation of the danger from rabies may be effected for the sake of public health of both human society and of domestic animals."

A. G. B.

DE RAADT (O. L. E.). **De Decentralisatie der Hondsdolheidbehandeling in Nederlandsch-Indië.** [The Decentralization in Treatment of Rabies in the Dutch East Indies.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 4. pp. 372–379.

De Raadt criticizes the paper of PONDMAN (this *Bulletin*, Vol. 18, p. 288), and points out that his views are too conservative after the results obtained by SEMPLE, in India (Kasauli). The author thinks that there should not be any hesitation in putting the dead fixed virus in the hands of medical men at the different out-stations and making them administer the whole course of the treatment and not only the commencement as suggested by PONDMAN. The voyage from the other islands to Java might cause a dangerous delay in the continuation of the cure.

W. J. Bais.

COONOOR. **The Pasteur Institute of Southern India, Coonoor. The Annual Report of the Director together with the Fourteenth Annual Report of the Central Committee of the Association for the Period ending 28th February, 1921.** [CORNWALL (J. W.), I.M.S.]—pp. 29. 1921. Madras: Printed by the Superintendent, Government Press. [For official use only.]

In the 12 months under review, 3,623 patients underwent a full course of treatment, the largest number in the Institute's history. Figures are given, covering eight annual periods, which go to show that the real death-rate after treatment is higher than the usual tables show, about 3 per cent., and that antirabic treatment reduces the likelihood of death from hydrophobia by 50 per cent. Another table indicates what proportion of persons bitten by rabid animals may be fatally infected. Of 225 such persons, 118, or 35·5 per cent., died from hydrophobia; that the animals in question were rabid is rendered certain by the fact that one of the persons bitten in each series succumbed to hydrophobia. All rabid dogs are not equally and invariably infective, either because the infective agent is not always present in the saliva or because some strains are less infective than others. In this way some of the failures of antirabic preventive inoculation may be explained. A series of tables give the usual information about the treated cases, and the report closes with the report of the Central Committee of the Institute.

A. G. B.

AUSTRALASIAN MEDICAL CONGRESS. TRANSACTIONS OF THE ELEVENTH SESSION HELD IN BRISBANE, QUEENSLAND, 21ST–28TH AUGUST, 1920. **Tropical Australia Discussion; Report, Sub-Committee; Provisional Resolutions, Executive Committee; Discussion; Resolutions.**—pp. 39–69. With 4 charts.

A full account of the Report of the Sub-Committee on "Tropical Australia" and the discussion thereon was given in the *Medical Journal of Australia* in 1920, and summarized therefrom in this *Bulletin*, Vol. 17, p. 223. The present report includes graphs which were omitted in the 1920 account. A perusal does not discover the omission of anything of significance. It would perhaps have been better to head the report and discussion—Tropical Queensland, for both the sub-committee and the speakers confined their attention to this portion of tropical Australia. It is also worth noting that the physiological factors were studied in persons inhabiting a narrow slip of coast land, whereas statistics and opinions were gathered from a much larger area with an admitted different climate. Further discussion might be clarified by disuse of the term Tropical Queensland in favour of Coastal and Upland Queensland.

A. G. B.

TUCKER (Clif.). **Where is Tropical Australia?** [Correspondence.]—*Med. Jl. Australia.* 1921. July 9. 8th Year. Vol. 2. No. 2. p. 37

BARRETT (James W.). **Tropical Australia.** [Correspondence.]—*Ibid.* July 23. No. 4. p. 73.

Dr. Tucker describes a region in Queensland about 100 miles from the sea and containing 400,000 square miles, *i.e.*, nearly two-thirds of the whole of Queensland, averaging 800 feet in height, possessing a fine winter climate and a tolerable summer climate with cool nights, with a wide variation between wet and dry bulb temperatures, and the corollary of rapid evaporation. It is this wide variation in his opinion that distinguishes a temperate from a tropic zone. This region is becoming slowly populated by a vigorous race, and nothing else is wanted but home comforts for the women in the matter of housing, water and food.

Sir James Barrett assents. He says that for the region described the mean wet bulb temperature is in January below 75° and in July below 60°; the temperature "offers no insuperable difficulty whatsoever to the development of a vigorous white race." He considers that the variation between wet and dry bulb readings is less important than the mean wet bulb reading, which "for people who clothe themselves in a manner suitable to the climate furnishes a tolerably correct index of discomfort."

A. G. B.

BREINL (A.). **Figures and Facts regarding Health and Diseases in Northern Australia influencing its Permanent Settlement by a White Race.**—*Australasian Med. Congress. Transactions of the Eleventh Session held in Brisbane, Queensland, 21st–28th Aug., 1920.* pp. 558–569.

This paper contains nothing of importance that has not been noted in previous work of this author and his Townsville colleagues [see

this *Bulletin*, Vol. 15, p. 298, and elsewhere]. It will suffice to cite the conclusions :—

"1. The facts collected and the observations recorded tend to prove that from the point of view of incidence of diseases other than tropical, North Queensland does not differ essentially from Central or South Queensland.

"2. Tropical diseases, with the exception of hookworm infection, are only scarce and easily controlled.

"3. Our investigations into the physiology of the inhabitants of the coastal areas of North Queensland, when compared with those of a temperate climate, have, as far as carried out, only shown a few quantitative but not qualitative changes.

"4. Up to the present the investigations carried out at the Tropical Institute have not brought to light any fact indicating that health and disease [*sic*], as prevailing in North Queensland, should make a permanent settlement by a white race impossible."

A. G. B.

ELLIOTT (C. H.). **The Life Insurance Aspect of Residence in Tropical Australia.**—*Australasian Med. Congress. Transactions of the Eleventh Session held in Brisbane, Queensland, 21st–28th Aug., 1920.* pp. 317–321.

The author, who is Chief Actuary, Australian Mutual Provident Society, says that it is doubtful whether any life office has yet had sufficient experience of lives in tropical Australia to enable it to say definitely what rate of mortality prevails among such cases, but from such figures as are available there is no need for differential treatment of North Queensland proponents.

A. G. B.

CANTLIE (James). **Life Insurance in the Tropics. Inaugural Address.** —*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Oct. 20. Vol. 15. No. 4. pp. 109–116. (Discussion pp. 116–117.)

Sir James Cantlie asks whether residence in the tropics impairs the health of the individual to such an extent as to justify the imposition of an extra premium by insurance companies. Many of these, on information the source of which is difficult to discover, appear to lump together climates of widely different character between the 33rd North and the 30th South parallel as "dangerously warm country." He notes that the white population of our tropical colonies consists chiefly of young men who go out in perfect health, protected by inoculation, with the knowledge how to avoid disease, and well housed, and that when they go sick they are well looked after or sent home Malaria he regards as the enemy of the employer rather than of the insurance company for it rarely kills, and owing to increased knowledge its danger is much less than formerly. The only other disease of importance in his opinion is dysentery, the death-rate from which has been greatly lessened by the practice of emetine treatment.

The first two or three years of tropical life are the most dangerous to the young European. He should not go out before 21, and the better age is 23 or 25. The present practice is for the insurance company to charge an extra premium when the young man who is already insured goes to the tropics, with the frequent result that the policy is allowed to lapse. Sir James' suggestion is that for the first five years the company shall reduce its liability, to be restored either at once or by stages when the dangerous period is passed, but it appears that this

proposal is unacceptable to the companies. Among insurance anomalies he mentions that of patients sent to a warm climate for their health being charged an extra premium, and that of old tropical residents, who having found they cannot keep their health at home and having returned to a warm climate, are penalized by their insurance company for trying to prolong their lives.

A. G. B.

ROGERS (Leonard). **President's Address.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.) 1921. June. Vol. 14. No. 8. pp. 28–31.

The greater part of this address seems to have been devoted to advocating the local study of tropical medicine in the tropical dominions. After referring at some length to the new School of Tropical Medicine in Calcutta and mentioning the other recent advances made in India, the speaker extolled the policy of the Liverpool School of Tropical Medicine in establishing laboratories of their own in West Africa and Brazil. He desired that, with the support of the City of London, the London School should follow the Liverpool lead ; or that, with the support of the Colonial Office, laboratories should be extemporized at the large hospitals in the tropical colonies, where subsidized workers should be sent, for terms of not less than five years, to study the local problems afforded for investigation. The sensational policy of despatching occasional costly expeditions to investigate sudden epidemics, and other such unusual phenomena, he considered to be now somewhat out of date, having served its purpose.

A. A.

JOHNSON (W. B.). **The Weanling in Upper Egypt.** [Correspondence.] —*Lancet.* 1921. Aug. 20. pp. 416–417.

[N.B.—The heading of this letter is misleading. The argument is the supposed relation between the nature of the diet and the incidence of gastric ulcer, appendicitis, and carcinoma.]

Referring to a letter by Nickells DUNN in the *Lancet* of 28th May, where it is suggested that the reason why gastric ulcer, appendicitis and cancer (either of stomach or of breast) are almost unknown among the poor-class rustic Arabs of Upper Egypt may be that these Arabs, going straight from the breast to a diet of coarse bread and *raw* fruit and vegetables, have wonderfully good teeth and powerful jaws, and therefore know nothing of dental caries, the present author suggests that the coarse, bulky vegetable diet may act in quite another way than by influencing the state of the teeth. He states that among the natives of Northern Nigeria, where also gastric ulcer, appendicitis and carcinoma are almost unknown, and the children go straight from the breast to a coarse, bulky, mainly vegetable diet, pyorrhoea and dental caries are not at all uncommon (possibly because these Nigerians *cook* their food). The circumstance common to these two classes of Africans being the bulky vegetable diet (and not the condition of the teeth), the present author hazards the suggestion that this sort of diet keeps the bowels in healthy movement preventive of intestinal stasis, and that this may explain the absence of gastric ulcer, appendicitis and cancer.

So far as Northern Nigeria goes, the author's argument is based on the observation that the natives relieve the bowel two or three times

daily and never suffer themselves to get constipated; and on the following interesting statistics:—

Of 400 Northern Nigerian convicts examined, 79·2 per cent. had pyorrhoea and 20 per cent. had dental caries.

In 750 surgical operations there was not one case of gastric ulcer (nor in nine years' work has gastric ulcer ever been observed *post mortem*); of appendicitis and appendicular abscess there were only four cases—two of these being in coast natives; of sarcoma only three cases (one in a coast native); of endothelioma and odontoma five cases—one being in a coast native; and of carcinoma not a single case. On the other hand there were 42 cases of benign tumours.

A. A.

HINGSTON (R. W. G.). **Physiological Changes at High Altitudes and their Relation to Mountain-Sickness.**—*Indian Jl. Med. Res.* 1921. July. Vol. 9. No. 1. pp. 173–190.

In the course of a survey expedition to the Pamirs the author investigated the phenomena of "mountain sickness," and made many observations of the blood of different people; and he comes to the conclusion that adaptation to great altitudes is accomplished through the red blood corpuscles which gradually increase in number with the progress of the ascent, and gradually return to the classical normal in the course of the descent and for some time after the return to low level. As an illustration the two following tables, each recording observations on one individual, may be compared:—

| Date. | Altitude. | Corpuscles per cu. mm. |
|---|---|---|
| April 10th .. .. .. | 700 feet. | 4,480,000 |
| May 12th .. .. .. | 4,390 ,, | 5,240,000 |
| May 21st .. .. .. | 8,000 ,, | 6,040,000 |
| May 28th .. .. .. | 10,000 ,, | 6,624,000 |
| May 30th .. .. .. | 11,960 ,, | 6,760,000 |
| June 1st .. .. .. | 12,400 ,, | 6,800,000 |
| June 21st .. .. .. | 13,300 ,, | 7,525,000 |
| June 23rd .. .. .. | 15,600 ,, | 7,840,000 |
| June 26th .. .. .. | 16,907 ,, | 7,640,000 |
| July 27th .. .. .. | 18,203 ,, | 8,320,000 |

| Date. | Altitude. | Corpuscles per cu. mm. |
|---|---|---|
| August 10th .. .. | 13,500 feet. | 7,402,000 |
| August 20th .. .. | 9,450 ,, | 7,360,000 |
| August 23rd .. .. | 8,500 ,, | 6,960,000 |
| August 28th .. .. | 8,000 ,, | 6,120,000 |
| September 6th .. .. | 4,390 ,, | 5,680,000 |
| October 20th .. .. | 500 ,, | 5,820,000 |

"Mountain-sickness" occurs if the increase of red blood cells is retarded unduly.

The author's argument is confirmed by his observations of the nomad inhabitants of the Pamirs—the Sarikolis and Kirghiz, who

live permanently at an altitude of about 13,000 feet. He found that their one peculiar feature is the richness of the blood, the mean number of red cells per cubic millimetre for seven Sarikolis being 7,596,000, and for certain Kirghiz, 7,920,000. A very interesting paper.

A. A.

JOURNAL OF TROPICAL MEDICINE AND HYGIENE. 1921. Dec. 1. Vol. 24. No. 23. pp. 306-309. [Leader.]—**Address of the Chairman, Professor A. Alcock, C.I.E., F.R.S., at the Annual Dinner of the London School of Tropical Medicine.**

Those who were present at the dinner of the London School of Tropical Medicine in October last, and many others who are readers of this *Bulletin*, will be glad to have a printed record of Col. Alcock's speech in proposing the toast of the School. More need not here be said.

A. G. B.

SODRÉ (Alcindo). **Campos do Jordão. Impressões medicas de viagem.** —*Brazil Medico.* 1921. Oct. 8. Year 35. Vol. 2. No. 13. pp. 177–179.

An account of a visit to the health station of Campos do Jordão on the Serra da Mantiqueira, a range of hills bordering the route from Rio de Janeiro to S. Paulo. The place is being developed with energy as a health resort. It is fairly easily accessible from both Rio and S. Paulo, and would appear to possess many amenities both of scenery and of climate. The altitude is a little over 5,000 feet, the air is dry and bracing, and the difference between the day and night temperatures is comparatively slight and the fall gradual. The average number of hours of sunshine per diem in winter is nearly double that of Davos. The climate has a uniformly favourable influence on metabolism, and, besides tuberculosis in all its forms, great benefit is derived in cases of diabetes, syphilis, rheumatism, respiratory and cardiac diseases, anaemias, gastric and intestinal complaints and neuroses. There is an English pension and a sanatorium for tuberculous patients.

F. S. Arnold.

THE ROCKEFELLER FOUNDATION. **Annual Report for 1920.**—xi+387 pp. With 103 figs. [1921.] New York: The Rockefeller Foundation, 61, Broadway.

Besides the reports of the Secretary and Treasurer, this report contains the President's review for the year, and the respective reports of the International Health Board, of the China Medical Board, and of the Director of the Division of Medical Education.

The outstanding feature of the China report has already been noticed in this *Bulletin* (Vol. 18, pp. 146 147), and the main items of the report on medical education are alluded to in the President's review which, along with the Report of the International Health Board, is here briefly summarized.

PRESIDENT'S REVIEW.

The President's review, full of wise aphorisms, reveals the inward and spiritual grace, as clearly as it describes for the year 1920 the outward and visible doings, of this beneficent organization.

The spirit is also dispassionately formulated in the following words :—

" Science knows no national boundaries. It is a world product, a common fund of knowledge to which all nations contribute and upon which each may freely draw. To keep open the channels of communication by personal migration and by printed page, to encourage the training of specialists, to foster the growth of institutions, to stimulate research, to encourage the application of scientific knowledge to the needs of nations, communities, and individuals, are tasks upon the successful performance of which largely depends the progress of the world in economic efficiency, physical health, and international goodwill. It is the aim of the Rockefeller Foundation to have a part in this great movement by helping to increase the common store of knowledge about the causes of disease, and through demonstrations and the services of trained experts to diffuse this information as widely as possible among all peoples. Thus does the Foundation seek to fulfil its chartered purpose 'to promote the well-being of mankind throughout the world.' "

The benefactions for the year are thus summarized :—

" During the year 1920 the Rockefeller Foundation (1) aided six medical schools in Canada, (2) gave a large sum to a medical training centre in London, (3) appropriated a million francs for the Queen Elizabeth Foundation for Medical Research in Belgium, (4) agreed to contribute toward the complete rebuilding of the medical school of the University of Brussels, (5) provided American and English medical journals or laboratory supplies for 11 medical schools and medical libraries in five European countries, (6) continued to construct and to maintain in Peking, China, a modern, medical school with a pre-medical department, (7) aided 31 hospitals in China to increase their efficiency in the care of patients and in the further training of doctors and nurses, (8) supported the School of Hygiene and Public Health of the Johns Hopkins University, (9) contributed to the teaching of hygiene in the medical school at São Paulo, Brazil, (10) provided fellowships in public health and medical education for 90 individuals, who represented 13 different countries, (11) brought to the United States commissions of medical teachers and hygienists from England, Belgium, and Czechoslovakia, (12) continued to support a campaign against yellow fever in South and Central America and in West Africa, (13) aided government agencies in the control of malaria in ten states of the South, (14) prosecuted hookworm work in nine southern states and in 18 foreign countries, (15) helped to expand anti-hookworm campaigns into more general health organizations in counties, states, and nations, (16) brought a war-time anti-tuberculosis work in France to the point where it could soon be left entirely in French hands, (17) assisted the government of Czechoslovakia to reorganize its public health laboratory system, (18) rendered various services in organizing committees to study the training of nurses and of hospital superintendents, lent experts for conference and counsel, sent officers abroad to study conditions, etc., (19) brought to a close its participation in war-time emergency relief by giving a million dollars to the fund for European children. These things were done in part by the Foundation, but chiefly through its departmental agencies—the International Health Board, the China Medical Board, and the Division of Medical Education."

The total expenditure for the year was over seven million dollars, of which nearly four and a half million was allotted to medical education, and something over two million to public health.

The programme for 1921 includes continued aid to medical education and to educational institutions in medicine and public health ; continuation and extension of campaigns against yellow fever, malaria, and hookworm disease, and the development of a public health laboratory service ; aids to surveys and research in dispensary organization, hospital administration, and management of the insane and

mentally deficient ; and contributions to bibliographical and secretarial organizations of appropriate kinds.

Among other things the review includes an appreciation of General GORGAS.

INTERNATIONAL HEALTH BOARD.

The facts of the interesting report of the General Director of the International Health Board for 1920 illustrate the old text that prevention is better than cure.

It is stated in the summary that the Board's anti-tuberculosis crusade in France was carried almost to the point at which it could be resigned officially to the Government ; that the campaign against yellow fever was continued in Central and Southern America, brought to a successful conclusion in Guayaquil and Ecuador, and prospected in West Africa ; that anti-malaria-mosquito operations were supported in ten Northern States, and projected elsewhere with a view to their general extension to the tropics ; that the war against hookworm was very widely prosecuted ; that several local governments, including Czechoslovakia, were assisted in various ways in maintaining a public health service ; that the schools of hygiene at Prague and São Paulo were aided ; and that much material assistance was given elsewhere in furtherance of education in public health.

The anti-tuberculosis operations in France included aid to dispensaries, provision of beds in hospitals, training of nurses, and extensive and varied educational enterprises. The short courses for doctors were successful beyond expectation.

The extermination of *Stegomyia fasciata*, of course, was the principal object of the measures against yellow fever, but the Noguchi protective serum was also distributed in certain places.

The preliminary proceedings against malaria and mosquitoes were hopeful. The measures employed in towns were simple drainage and levelling, channelling streams, clearing and cleaning streams and ponds, letting in sunlight, oiling, and the use of the top-minnow. In rural areas oil and top-minnows were most in use, the latter in some places proving extremely effective. A promising experiment was made with quinine in a selected area of 100 square miles having a population of 9,000 ; all persons ascertained to be infected with parasites, or having an authentic history of recent attack, received an annual free treatment of ten grains of quinine daily for a term of eight weeks, and it is estimated that as a result the malaria incidence was reduced from 40 per cent. in 1917 to 18 per cent. in 1920, at a *per capita* cost of 1·08 dollars in 1918, 1·09 dollars in 1919, and 0·38 dollars in 1920.

The imposing hookworm campaign, justifiable *per se* and particularly impressive as an object lesson, was continued in nine Southern States of the Union and in 25 foreign countries, and was prospected in 16 other foreign countries.

As regards assistance to education in hygiene, the Board adopts the principle that the main road to public health lies in the practical training of men in the fundamental sciences and in methods of administration.

The very full appendices to the report deal with hookworm disease in many aspects and hookworm control, operations against yellow fever, and the work of county health departments.

The financial statement for the year accounts for an expenditure of 1,658,269 dollars on all the various activities of this munificent Board.

A. A.

## REVIEWS AND NOTICES.

**The Practice of Medicine in the Tropics. By Many Authorities. Volume 2.** Edited by BYAM (W.) [O.B.E.; Lieut-Colonel, Royal Army Medical Corps (retired); etc.] and ARCHIBALD (R. G.) [D.S.O., M.D.Edin.; Major, Royal Army Medical Corps (retired); Director of the Wellcome Tropical Research Laboratories, Sudan Government, Gordon College, Khartoum; etc.].—xx + 857–1682 and index. Figs. 335–577; plates 36–66 and 1 map. 1922. London: Oxford Medical Publications. Henry Frowde and Hodder & Stoughton. [Price £4 4*s*.]

*Section VII. Differential Diagnosis* (pp. 857–950): *Section VIII. Bacterial Diseases* (pp. 951–1210).

The first volume of this important book was reviewed in the *Tropical Diseases Bulletin*, Vol. 19, p. 259. It reached such a high standard of merit that the appetite was whetted for more, and one turns to the second volume with a favourable prejudice and an agreeable anticipation. With this part of the work the clinical descriptions of the diseases of the tropics begin. Sections VII and VIII deal with Differential Diagnosis and Bacterial Diseases. All the authors are recognized authorities on the subjects upon which they write; this is tantamount to saying that their accounts of the different diseases bear the stamp of practical experience, and there can be no doubt that this book will be, for many years to come, an authoritative guide to the medical practitioner in the tropics.

The title adopted for the book has obviated the difficulty of deciding what to include in it, since almost all the diseases met with in temperate climates occur also in the tropics. But practical considerations limit the contents to descriptions of those diseases which are especially prevalent in warm climates, and to those modifications of type which the cosmopolitan diseases are apt to undergo, in the tropics, especially when they attack the indigenous inhabitants.

Few men are so favourably situated that they can be specialists in hot countries. In these parts of the world, where, as a rule, doctors are few in number in proportion to the general population, and often isolated from their medical colleagues, men learn to be more practical and self-reliant than it is necessary to be in civilized countries in the temperate zones. The competent tropical physician turns his hand to many things, and requires considerably more than a general knowledge of bacteriology, pathology, protozoology and kindred subjects. The comparatively few laboratories that exist are almost confined to the larger towns, and it is not always possible to send pathological material to experts for examination. These reflections are suggested by a consideration of the contents of these Sections. In almost all the articles much more space is allotted to bacteriology than one is accustomed to see in a work on the Practice of Medicine. In some cases, indeed, the clinical descriptions seem rather brief in comparison. But, for the reasons given above, I think that the editors have done well in giving too much bacteriology rather than too little.

As is befitting, the chapters on Differential Diagnosis are contributed by the senior editor. This, which is one of the most important subjects dealt with, is also that which presents the greatest difficulties to the physician who has not had much experience of tropical diseases. The account given of the several lines of investigation to be followed in a case of "fever" is very full and complete, and will be carefully read and re-read, though a good many of the conditions described have no special connexion with the tropics. Chapter XLI, on Chronic Conditions of Ill-health, met with in the tropics, is very helpful. The author insists very rightly on the fact (which, however, is often ignored) that tropical infections are more often multiple than single, and on the necessity of

a routine systematic examination, no matter what the symptoms may be. This is no mere counsel of perfection, but a simple statement of a plain duty.

Again, stress is laid on the importance of bearing in mind the frequency of amoebic liver abscess in all cases of "general debility" in patients from the tropics. This may seem to be an obvious truism, but it is one, also, that is frequently overlooked.

The whole of this chapter is full of useful hints, and there is a sufficient description of such laboratory procedures as blood cultures, estimation of the functional activity of the pancreas, and so on, to enable the general practitioner to appraise their value, and to collect, in a suitable way, material for submission to a laboratory.

There are some brief, but wise, remarks on the necessity of considering the psychology of patients invalided home from the tropics. This can scarcely be understood except by those who have had personal experience of hot countries, where the general conditions of life, its duties, responsibilities and anxieties are so different to those of temperate climates.

I cannot refrain from entering a protest against the use of that common expression, the "acute abdomen," sanctioned though it seems to be by high authority. Surely the abdomen is not acute, though its condition may be. In a work which extends to several thousand pages, this colloquialism cannot be justified even on the grounds of brevity.

The introduction to the section on Bacterial Diseases, contributed by Dr. Carl H. Browning, consists of a brief statement of the principles of such subjects as infection, immunity, serological diagnosis and anaphylaxis.

Chapter XLIII, by Colonels D. Harvey and J. H. Tull Walsh, gives an interesting account of the Enteric Fevers, but without much reference to the modifications of clinical conditions seen in the tropics. There are too, only scanty allusions to the diseases as they occur in native races. The section on diagnosis is almost entirely confined to laboratory methods, which suggests that, in the opinion of the authors, these are the only ones worth consideration. No one would question the truth of the statement that the bacteriologist has the final word in the diagnosis of enteric (though even he is not quite infallible). Actually, however, it is not every practitioner in the tropics who has a laboratory at his own disposal. More often material has to be sent away to a distance to be examined by others, and a report cannot be expected for several days. In the meanwhile the medical attendant has to diagnose and treat his case. In the reviewer's opinion, some of the bacteriology might have been omitted, and the space so saved devoted to clinical diagnosis.

There must be few parts of the tropical world where the statement that epidemics of enteric are to be expected in large fairs and pilgrim gatherings holds good.

Sir P. W. Bassett-Smith has written the chapter on Undulant Fever. This gives a very thorough account of its bacteriology, pathology and clinical symptoms, and is illustrated by a number of most instructive temperature charts. The whole article is very full and vividly descriptive of the disease.

The chapters on Plague are shared by Dr. Victor G. Heiser and Dr. Wu Lien Teh (G. L. Tuck), the former writing on bubonic and the latter on pneumonic plague. Both articles are excellent. Though necessarily rather brief, nothing of importance has been left out, and they may be regarded as examples of judicious condensation such as is possible only for those who are thoroughly acquainted with their subject and possess that rather rare mental asset, a fine sense of relative proportion.

The subject of Cerebrospinal Fever is in the hands of Dr. J. Alison Glover and Mr. E. G. D. Murray. There is a very good account of the bacteriology and pathology of the disease, but the clinical part is rather meagre and describes cerebrospinal fever as it occurs in temperate climates and in the white races.

The chapter by Sir W. BUCHANAN refers to the epidemiology of cerebro-spinal fever in Indian jails. The facts and statistics given are of high interest.

Sir Leonard ROGERS has managed to compress into twenty pages an admirable article on Asiatic Cholera. The section on treatment is particularly good; this is to be expected from the accomplished author who has himself elaborated on logical lines the modern treatment of the disease.

Dr. P. H. MANSON-BAHR and Major H. Marrian PERRY, in collaboration with the late Sir Patrick MANSON, are the authors of the chapter on Bacillary Dysentery. This is certainly one of the best articles in this part of the book. There is a very complete account of the bacteriology, in which is incorporated a great deal of the experience gained in different countries during the war. The section on the morbid anatomy is the best that the reviewer has seen, and that on diagnosis is very good. The illustrations by Dr. MANSON-BAHR deserve unstinted admiration.

Dr. G. W. McCOY has given a masterly account of Leprosy. It is very interesting and explicit, but not at all dogmatic. The section on prognosis is clear and judicial in tone, and there is an able and impartial summary of the various forms of treatment in use.

The article on Tuberculosis in the Tropics, by Dr. G. E. BUSHNELL, discusses the various types of tuberculosis which occur among the different races in the tropics, and a useful comparison is made between the different climates recommended for tuberculous patients.

The frontispiece to this volume is a fine portrait of the late Professor A. LAVERAN.

The reviewer has read these Sections with great pleasure and great profit to himself. It can be thoroughly recommended to all who wish to know the actual state of our knowledge of the different diseases included in its scope. Where there is so much to admire it may seem rather ungracious to point out what are, after all, rather minor blemishes. The chief one of these is that some of the articles appear to refer more to tropical diseases as seen in the white races in the tropics than as they occur among the native populations. Yet it is the latter who constitute the majority of the patients of most doctors who practise in hot countries. It is also rather disappointing to find that most of the articles ignore the practical difficulties of tropical practice among races with strong dietary and caste prejudices, and of general treatment where trained nurses are so often not available.

The paper, type and illustrations are of the high quality that one is accustomed to expect in the Oxford Medical Publications; but the binding is not worthy of such an excellent book (and of one, moreover, which is so expensive), if the copy sent for review can be taken as a fair sample. This arrived with the covers badly warped and blistered. The book also is too heavy; it weighs about six pounds. Its bulk and weight make it very uncomfortable to read even in England. What will it be like in the tropics? It certainly is not a book for a tired doctor to read in a "long chair." I think that this work would be more popular and useful, if the volumes were halved in bulk and their number doubled.

H. J. Walton.

*Section IX. Spirochaetal Diseases* (pp. 1211–1334): *Section X. Protozoal Diseases* (1335–1682).

Sections IX and X are devoted to the consideration of Spirochaetal and Protozoal Diseases respectively. As in earlier sections of this work the matter is presented in an interesting and attractive manner, and, generally speaking, contains all the information a medical practitioner in the tropics is likely to require about the subjects dealt with. There are many illustrations and numerous coloured plates, some of which are of a high degree of excellence. The last remark is particularly true of the plates illustrating the lesions of amoebic dysentery, which appear to be as near perfection as is possible; while those depicting the parasites of malaria leave little to be desired. Some of the plates, however, are hardly

worthy of their place. Plate XXXVI, Fig. 2, shows the blood in relapsing fever, but it is evident that the drawing has been made from a film stained with bad Leishman stain. The same remark applies to Fig. 2 in Plate XXXVII, where it is clear that the nuclei of the leucocytes have not even taken the stain properly. The two figures on Plate XLIX illustrating the stool in bacillary and amoebic dysentery are not sufficiently characteristic if they are intended to represent the typical appearances of the stool in those diseases, while the amoebae figured in Plate LI are crude. Apart from those failings the plates as a whole are excellent.

As regards the text the arrangement of the matter is clear and concise, particularly in the case of those diseases which have been dealt with in single chapters, but in the case of malaria one cannot help feeling that a multiplicity of authors has led to some confusion and needless repetition.

It is evident that the book is in every sense a practice of medicine, and not a book of reference, but it has undoubtedly suffered to some extent by delay in production, as some of the more important recent additions to our knowledge have been treated in a summary manner or omitted entirely. But the reader need not fear that he will miss anything essential to the handling of his cases.

The Spirochaete section includes chapters on infectious jaundice, yellow fever, relapsing fever, syphilis, yaws, bronchial spirochaetosis and rat-bite fever. As an introduction to the spirochaetal diseases, Major R. G. Archibald has written a chapter on the Spirochaetes as a whole. These organisms are correctly described and are rightly regarded as more nearly related to the bacteria than to the protozoa, though the statement that they multiply by longitudinal as well as transverse division is open to serious question. Too much is taken for granted as regards the granule phase, the existence of which is disputed by many competent observers, while it is difficult to realize why such a granule phase (rather than a spirochaete itself) "clinically would suffice to explain the causation of relapses in spirochaetal diseases."

The writer of this section has confused the issue regarding the nomenclature. It was in 1838 and not in 1834 that Ehrenberg created the genus *Spirochaeta*, and it was the name *Spironema* and not *Treponema* which Klebs used for a flagellate, and this in the year 1893 and not 1902.

The opening sentence to this section implies that the spirochaetal diseases are of interest at home to systematists alone, but practically all the spirochaetal diseases discussed occur in temperate as well as tropical climates, and some of them are actually less common in the tropics, so that the researches on the spirochaetes have surely proved of interest to clinicians as well.

As was to be expected, Dr. Hideyo Noguchi has presented a clear and trustworthy picture of what is known of Infectious Jaundice and its causative organism, *Leptospira icterohaemorrhagiae*.

The article on Yellow Fever, which the author, Assistant Surgeon-General H. R. Carter, states was written over two years ago, contains a good account of yellow fever from every point of view up to the time of Noguchi's first announcement of the discovery of a Leptospira in this disease. The subsequent work of Noguchi and Kligler is referred to in an addendum. Their conclusions appear to the author to be unquestionable, and he has no hesitation in regarding Noguchi's organism as the cause of yellow fever. No mention, however, is made of Stimson's discovery (1907) of what appears to be the same parasite in the kidney of a case of yellow fever, which he named *Spirochaeta interrogans*. In the addendum a brief mention is made of Noguchi's curative serum and protective vaccine.

In the chapter devoted to Relapsing Fever, which is written by Professor J. L. Todd, we find that the author has adopted the rational view that all the types of the disease, whether transmitted by lice or ticks, are due to the one organism, *Spironema recurrentis*, and that the various supposed species are merely variations of this one form. The method of transmission by the tick, *Ornithodorus moubata*, is described in detail, but Nicolle's careful experiments with lice would seem to merit more

attention. Apart from *Ornithodorus moubata* and pediculi, various other vectors are mentioned, but some of these have not been experimentally proved to convey the disease. Thus, *Argas persicus* and *Ornithodorus tholozani* are both accused of transmitting the disease in Persia, but actual proof of this is still lacking. Similarly *Ornithodorus turicata* is only a suspect in Colombia. On the question of the granule phase the author is less dogmatic than the writer of an earlier section, though it is evident he believes the granule to play a part in the developmental cycle. The statement that encysted forms occur in the tick evidently does not mean that actual cysts are formed.

The symptomatology, diagnosis and treatment are well described, but it would seem that more emphasis could have been given to that type of the disease which may give rise to suspicions of infectious jaundice or yellow fever.

The article on Syphilis by Dr. W. Fletcher seems to contain all the information necessary to a worker in the tropics. From the point of view of differential diagnosis, however, no mention is made of the possibility of confusion with ulcus tropicum or the South American espundia.

In an addendum at the end of this volume the details of the Sachs-Georgi reaction and Dreyer and Ward's modification of it, known as the Sigma reaction, are carefully described.

Yaws has been dealt with by Dr. A. Castellani and the late Dr. A. J. Chalmers in a clear and concise manner. Attention may be drawn to the beautifully executed colour plates illustrating the lesions.

The condition known as Bronchial Spirochaetosis is definitely raised to the rank of a disease in an article by Major R. G. Archibald. The wisdom of this procedure is open to question, for it is far from being established that any such disease exists, though the presence of numerous spirochaetes in the expectoration of various lung conditions is a well-recognized fact. That these spirochaetes are in any way primarily responsible for the condition, or that the particular species, here referred to as *S. bronchialis*, actually occurs, has never been demonstrated. The spirochaetes in the expectoration are probably saprophytic organisms which have invaded the bronchi from the mouth. Fantham's description of *S. bronchialis* has not been confirmed, and the statement that the organism possesses a crista is more than doubtful, as such a structure is present in no known spirochaetes apart from the large Cristispira which occurs in oysters.

At the hands of Dr. C. C. Bass Rat-Bite Fever receives all the attention it deserves. It is doubtful if the Streptothrix isolated by Schottmuller is now regarded by any one as the cause of the disease; this is generally admitted to be due to *Spirochaeta morsus muris* (not *murium*), which receives due attention.

Protozoal diseases are dealt with in Section X. This includes an introductory chapter followed by others on amoebiasis, the amoebae of the human intestine, trypanosomiases, leishmaniasis, intestinal flagellates, coccidiosis, malaria (ten chapters), balantidiasis. Reviewing these generally they are undoubtedly good and up to date, and medical men will find all the information they require.

In the Introduction Mr. Clifford Dobell defines the position of the protozoa in the animal kingdom and discusses the important question of the relationship of a parasite to its host.

The chapter on Amoebiasis by Mr. Clifford Dobell and Dr. G. C. Low and the one on the Amoebae by the first of these authors leave nothing to be desired, and with them as a guide there should be no difficulty in understanding and dealing with all the pathological conditions arising from amoebic infections. The excellent illustrations have already been mentioned.

Trypanosomiasis has been dealt with by Professors B. Blacklock and Warrington Yorke in a thoroughly useful and rational manner, in three sections devoted respectively to the African trypanosome of man, the South American trypanosome of man and the trypanosomes of domestic animals. All the important facts connected with the disease are included and,

though the section devoted to the actual treatment seems short for a book of this title in comparison with the other matter dealt with, it describes all essentials. The numerous species of trypanosome have been reduced to a small number, of which the others are regarded as races or varieties. The proved tsetse-fly carriers of the various trypanosomes are arranged in a useful table. In the case of *Glossina morsitans* the dates attached to *T. congolense*, *T. ignotum* and *T. simiae* should be 1912 and not 1913, whilst KLEINE and FISCHER's transmission of *T. gambiense* by this fly was noted by them in 1912. The reviewer can find no reference to the successful transmission of *T. gambiense* by *G. morsitans* by the Royal Society's Commission before 1915.

The difficult subject of the reservoir host of *T. gambiense* and *T. rhodesiense* is considered, but it seems that the actual position has not been quite clearly stated. As regards the former, DUKE's discovery of what he regarded as *T. gambiense* in the sitatunga in 1912 is referred to, but his later discovery (1921), which possibly appeared too late for inclusion, of trypanosomes of the *T. brucei* type in these animals in the same region of Victoria Nyanza is not mentioned. DUKE's conclusion is that the trypanosome of the *T. gambiense* type originally present in the sitatunga (1912) has now reverted to the *T. brucei* type (1921). It must be recognized, however, that in the earlier work the trypanosome was not studied in small animals such as the guinea-pig, whereas in the later work it was, and it was chiefly on account of the appearance of posterior nuclear forms in guinea-pigs that the trypanosome was recognized as of the *T. brucei* type. It is possible that if guinea-pigs had been used in the early work these forms would have appeared. In any case the absolute diagnosis of *T. gambiense* is exceedingly difficult, and it is clear that many of the claims that have been made as to *T. gambiense* occurring naturally in animals are little more than guesses. This being so, the bald statement that *T. gambiense* has been found in the animals mentioned on pages 1410 to 1414 requires some qualification. Thus, the statement that DUKE found *T. gambiense* in a buffalo and a hyaena in West Uganda is not quite correct. He found a trypanosome resembling it, but was careful to state that an absolute diagnosis could not be made. SIMPSON (1918) is quoted as having found *T. gambiense* in an ox on the Gold Coast. Surely this observation was in a reed buck?

As regards *T. rhodesiense*, though the authors appear to adopt the view of its identity with *T. brucei*, they nevertheless refer to the widespread infection of game with *T. rhodesiense*. There is no known means of distinguishing these trypanosomes, so it is evident that those found by them in game might equally well be named *T. brucei*. On the other hand, KLEINE, TAUTE, and others believe that *T. rhodesiense*, though morphologically identical, is nevertheless a species distinct from *T. brucei*; and if this is so it is evident that the trypanosome in the game might be either of these. The German observers regard all the game trypanosomes of this type as *T. brucei*, and consider that KINGHORN and YORKE's statement that *T. rhodesiense* occurs in game is incorrect. They further believe that no actual animal reservoir for *T. rhodesiense* has been found.

The human trypanosome of South America is placed in a separate genus, *Schizotrypanum*, but it should be remembered that reproduction by schizogony, which was at first supposed to be the method of reproduction of this trypanosome, and led to the creation of this genus, is now known not to be its normal method.

Kala Azar and Cutaneous Leishmaniasis are dealt with by Major R. G. ARCHIBALD, who has presented a clear and accurate picture of our knowledge of all aspects of these diseases. It is possible that more details of the method of administration of tartar emetic intravenously and the dangers and contra-indications might have been given with advantage. A small error occurs on p. 1459, where Werner is spelt Wemer. No mention is made of the emetine treatment of Oriental sore, which has given some striking results, while it is a pity that the serious South American condition

espundia, is not illustrated by any figure. The statement that it was the probability of the existence of a flagellate stage in insects that led Ross to assign the parasite of kala azar to a new genus, *Leishmania*, is not correct. Ross examined DONOVAN's preparations and concluded the organism belonged to the Sporozoa and proposed the name *Leishmania* in 1903, about eight months before ROGERS' announcement of the discovery of the flagellate stage appeared.

The Intestinal Flagellates of man and Human Coccidiosis are clearly described by Mr. Clifford DOBELL. The condition frequently referred to as "flagellate diarrhoea" is regarded by the author not as a diarrhoea caused by flagellates but merely as one which has caused the flagellates to be discovered.

The ten chapters devoted to the consideration of Malaria contain an enormous amount of useful and accurate information. The general impression one gains from these chapters is that malaria as a disease amongst Europeans and natives in the tropics has not sufficient prominence. The malaria amongst troops returning from the war and the disease as it occurred in England during this period is too much in evidence.

The articles devoted to malarial surveys and malarial prophylaxis are written round the measures undertaken in England in recent years, but the medical man in the tropics is working under very different circumstances and amongst people who are prejudiced and suspicious, and more information concerning the difficulties to be met would not have been out of place in a book of this kind. It would have been better if the whole question of malaria from the point of view of public health had been dealt with by one author. Certain aspects of the subject have already been dealt with in Volume 1, and much of the ground covered there is again traversed in the sections now under review. As an example, subsoil drainage is dealt with in Volume 1 and is illustrated by a picture, while the subject again appears with an illustration in the present section.

The section on the parasites of malaria by Drs. J. D. THOMSON and H. M. WOODCOCK is excellent, and the coloured plates are very good indeed. The character of the various parasites, their differential diagnosis and life-histories are accurately described, though the details of their development in the mosquito naturally do not include certain observations which were published subsequently to the writing of the article. The parasite of malignant tertian malaria is placed in the genus *Laverania*. SCHAUDINN long ago pointed out that a difference in shape of the gametocyte was hardly sufficient ground for a generic distinction, and this is the opinion of the reviewer.

The views of the first of the authors of this chapter as to the presence of a capsule, other than that produced by the red blood corpuscle, around the crescent are stated somewhat dogmatically. The reviewer, at any rate, is not convinced of its occurrence, nor is he inclined to believe that the process of escape of the female gamete through a pore in the capsule, as described here, is a normal phenomenon. In Part v of this article the relation of the human malarial parasites to those of other animals is considered, and the statement is made that WOODCOCK (1914) showed that SCHAUDINN's view of their connexion with trypanosomes was incorrect. It seems somewhat of a paradox that the one observer who for many years persisted in upholding SCHAUDINN's doctrine in the face of overwhelming evidence produced against it by other workers should now take the credit of having disproved the very theory he tried to support. Very little reference is made to abnormal forms of the malaria parasites. The so-called *Plasmodium tenue* is mentioned, but the "tenue" phase of *P. vivax* is not described. An explanation of some of these forms might have been given, and illustrations could, with advantage, have been included. It is the unusual types of the parasites which give rise to difficulties, and workers in the tropics will often refer to this book in the hope of obtaining guidance in such matters.

Four chapters by Colonel S. P. JAMES on the pathology, symptomatology, diagnosis and treatment of malaria deal with almost every aspect of these questions, though it is here that the war element referred to above figures so prominently. Nevertheless, the account is accurately and clearly written, and the reader can rely upon it as giving a true idea of the subject. There are, however, one or two omissions. The influence of shock and exposure in bringing on attacks of malaria is hardly noticed, and the importance of avoiding such attacks in connexion with surgical operations might have been mentioned here, though it will probably be dealt with more fully in another volume. No mention is made of the influence of malaria on women in the tropics, especially in relation to pregnancy, but here again the subject may be left for consideration in a forthcoming chapter.

In a book of this size one would have expected some reference to be made to the important work of SERGENT on the action of quinine in bird malaria, the only malarial parasite that can be satisfactorily studied in animals, work which has yielded results that may possibly have a direct bearing on the therapeutics of the human disease.

The much disputed question of intramuscular injections of quinine in malaria is carefully considered, though the statement that such injections sometimes cause necrosis is hardly accurate. It is probable that every injection causes some necrosis, but the permanent bad effects are seldom observed. It is advised that when quinine cannot be retained by the stomach, owing to persistent vomiting, the drug should be administered intravenously. This advice may be disputed by some clinicians who would prescribe intramuscular injections, reserving the intravenous medication for those cerebral cases which require immediate treatment. The subject of cinchonism and the danger of large doses of quinine should have received more attention, and there is no reference to the possibility of quinine amblyopia.

The general and detailed instructions which have been given for the handling of cases of malaria are quite sound and reliable, and have evidently been carefully thought out. The standard treatment advocated by BASS, though very similar to that recommended here, might have merited explicit mention.

A very useful chapter on serious cases of malaria, its complications and sequelae, is written by Colonel S. P. JAMES and Major S. R. CHRISTOPHERS. Blackwater Fever is rightly included, though for some reason a rather apologetic note explains that this is done for purposes of convenience. The view that blackwater fever is a complication of malaria is well expressed in the statement that prophylaxis against it is the reduction of liability to malaria. The influence of shock and exposure to cold in inducing attacks is not referred to, though it is well known that subjects of chronic malaria frequently suffer on their return from the tropics to the colder climate of Europe. It is exceedingly important for such individuals to keep themselves carefully protected from sudden changes of temperature.

Severe dysenteric types of malaria are referred to. That malaria alone can give rise to a true dysenteric condition is very doubtful. It seems far more probable that in these cases, in spite of negative bacteriological examinations, the two common diseases, malaria and dysentery, coexist.

The final chapter on Balantidiasis by Mr. Clifford DOBELL and Dr. G. C. LOW is complete and calls for no special remark.

A useful key map of the world and a good index complete this interesting volume, which has undoubtedly maintained the high standard set by Volume 1. Very little redundant matter has been included, and a wise discrimination has undoubtedly been exercised in the selection of such matter as will be of service to the medical practitioner in tropical countries.

C. M. Wenyon.

EGYPT. Ministry of the Interior. Department of Public Health. Reports and Notes of the Public Health Laboratories, Cairo.—**Nutritive Value and Characters of Rations issued to Officials and Others in Different Administrations of the Egyptian Government.** [WILSON (Wm. H.)]—57 pp. 1921. Cairo: Government Press. To be obtained from Govt. Publications Office, Old Ismailia Palace, Sharia Qasr el Aini, Cairo. [Price P.T. 20.]

The bulk of this document consists of tables, fifty-seven in all. It is obviously impossible for any reviewer to verify the correctness of this mass of figures. The Egyptian Government is, however, fortunate in being able to command the services of such a capable and trustworthy adviser as Professor Wilson, of Cairo, to whom they owe the compilation of these valuable statistics. He vouches for their substantial accuracy in his preface.

Diets are given for different ages, occupations, etc., for schools, prisons, and other institutions and walks in life. Considerable attention is directed to an adequate supply of calories under various conditions, to the remedy of deficiencies and errors, and in general to a raising of the standards to a physiological basis. Professor Wilson has before urged reform in prison diets; some of his recommendations were carried out, but he again presses home what is still necessary.

The Egyptian diet is much more on a vegetarian basis than our own, but it is shown how this may be compensated for without unduly altering the national habits. On the whole the diets are below the European standard, the paucity of animal protein being the main cause of difference.

Pellagra is a disease which in Egypt is a special danger. Professor Wilson points out that his former advice to increase the protein intake has, where it has been followed, produced a great diminution in the incidence and fatality of the disease.

No special reference is explicitly made to vitamins, but it was evidently at the back of Professor Wilson's mind, as is seen in the articles he recommends as foods. The omission of the actual word is perhaps wise. Government officials are too apt to use or misuse a word which they do not understand, and the use of which (without its practical application) may cover their sins of omission.

W. D. Halliburton.